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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-355376

(43)Date of publication of application : 24.12.1999

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(51)Int.Cl.

H04L 27/38
H04B 1/707
H04L 27/22

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(21)Application number : 11-096981

(22)Date of filing : 02.04.1999

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(30)Priority

Priority number : 10 96151 Priority date : 08.04.1998 Priority country : JP

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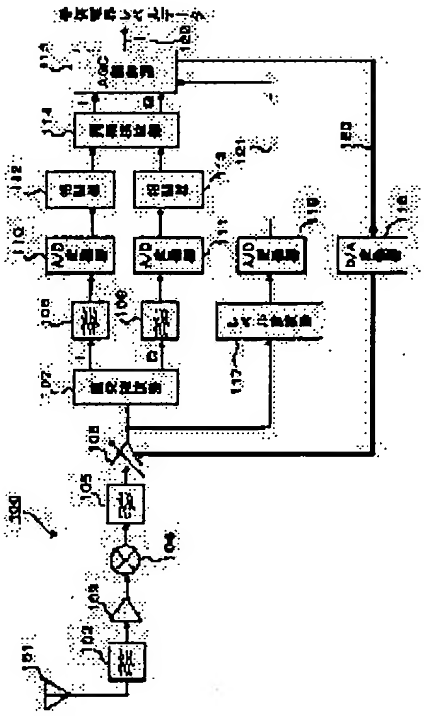
(54) RECEIVER AND RECEPTION METHOD



(57)Abstract:

PROBLEM TO BE SOLVED: To conduct reception gain control and detection of a received electric field level with a low consumption current.

SOLUTION: A gain control amplifier 106 amplifies a received orthogonal amplitude modulation signal, an orthogonal detector 107 conducts the orthogonal detection of the amplified signal, A/D converters 110, 111 convert I, Q signals obtained by the orthogonal detection into digital signals, correlation devices 112, 113 detect the correlation of the digital I and Q signals, a synchronization detection section 114 takes synchronization detection from the correlation detection data and an AGC control section 115 conducts the automatic gain control of a gain control amplifier 106 in response to the I and Q signals so that the I and Q signals after the synchronization detection become constant. Since the automatic gain control is conducted in response to the I and Q

signals at a low speed symbol rate after the synchronization detection, the current consumption of the AGC control section 115 conducting the automatic gain control is reduced.

LEGAL STATUS

[Date of request for examination]	04.08.2000
[Date of sending the examiner's decision of rejection]	13.01.2004
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	
[Date of registration]	
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

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CLAIMS

[Claim(s)]
[Claim 1] The receiving set characterized by to provide the function perform automatic gain control at the time of said magnification according to that I and Q signal so that the received quadrature amplitude modulation signal is amplified, correlation detection may be performed after changing into a digital signal I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal, and I and the Q signal which are obtained by performing a synchronous detection after this correlation detection may become fixed.
[Claim 2] A gain control magnification means to amplify the received quadrature amplitude modulation signal, and a rectangular detection means to perform rectangular detection of said magnification signal, An A/D-conversion means to change into a digital signal I and the Q signal which were obtained by said rectangular detection, So that a correlation means to perform said digital I and correlation detection of a Q signal, a synchronous-detection means to take a synchronous detection from the correlation detection data of this correlation means, I after said synchronous detection, and a Q signal may become fixed The receiving set characterized by providing the AGC control means which performs automatic gain control of said gain control magnification means according to the I and Q signal.
[Claim 3] It is the receiving set according to claim 2 which the signal level of the intermediate frequency band outputted from a gain control magnification means is detected, a level detection means output this detection data to an AGC control means is established, and said AGC control means performs automatic gain control of said gain-control magnification means according to said detection data before reception synchronous acquisition, and is characterized by for after reception synchronous acquisition to perform said automatic gain control by I after a synchronous detection, and the Q signal.
[Claim 4] The convergence reference value of the 1st AGC loop formation with which an AGC control means consists detection data of PIF, a gain control magnification means, a level detection means, and an AGC control means in the automatic gain control performed before reception synchronous acquisition is set to PR1. - the difference of PIF-PR1 -- the receiving set according to claim 3 characterized by carrying out so that -A1 (PIF-PR1) of the gain control data which equalized about the value and carried out the multiplication of the gain A1 of said 1st AGC loop formation to this may be set to 0.
[Claim 5] The receiving set according to claim 3 characterized by obtaining received electric-field level data when an AGC control means uses I after a synchronous detection, and a Q signal and calculates this square root of I2+Q2 after reception synchronous acquisition.
[Claim 6] An AGC control means received electric-field level data for the automatic gain control performed after reception synchronous acquisition PB, The convergence reference value of the 2nd AGC loop formation which consists of a gain control magnification means, a rectangular detection means, an A/D-conversion means, a correlation means, a synchronous-detection means, and an AGC control means is set to PR2. - the difference of PB-PR2 -- the receiving set according to claim 5 characterized by carrying out so that -A2 (PB-PR2) of the gain control data which equalized about the value and carried out the multiplication of the gain A2 of said 2nd AGC loop formation to this may be

set to 0.
[Claim 7] The receiving set according to claim 2 or 3 characterized by detecting temperature, establishing a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and said AGC control means amending the temperature anomaly at the time of automatic gain control with said temperature coefficient.
[Claim 8] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- detection data -- the convergence reference value of PIF and the 1st AGC loop formation -- PR1 and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PR1) -- the receiving set according to claim 7 characterized by carrying out so that -A1 (PIF-B-PR1) of the gain control data which equalized about the value and carried out the multiplication of the gain A1 of said 1st AGC loop formation to this may be set to 0.
[Claim 9] The receiving set according to claim 7 characterized by an AGC control means amending the received electric-field level data which use I after a synchronous detection, and a Q signal, and are called for by count of this square root of I2+Q2 after reception synchronous acquisition according to a temperature coefficient.
[Claim 10] the automatic gain control which an AGC control means performs after reception synchronous acquisition -- received electric-field level data -- the convergence reference value of PB and the 2nd AGC loop formation -- PR2 and a temperature coefficient -- B -- carrying out -- the difference of - (PB-B-PR2) -- the receiving set according to claim 9 characterized by carrying out so that -A2 (PB-B-PR2) of the gain control data which equalized about the value and carried out the multiplication of the gain A2 of said 2nd AGC loop formation to this may be set to 0.
[Claim 11] An operation magnification means for an AGC control means to generate a reference signal and a change signal, and to output the differential signal of said reference signal and the detection signal outputted from a level detection means, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The receiving set according to claim 2 or 7 characterized by forming the 1st analog AGC loop formation which consists of said gain control magnification means, said level detection means, said operation magnification means, and said selection means, and performing automatic gain control by this 1st analog AGC loop formation.
[Claim 12] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 1st analog AGC loop formation -- PREF -- carrying out -- the difference of - (PIF-PREF) -- the receiving set according to claim 11 characterized by carrying out so that -Aa (PIF-PREF) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.
[Claim 13] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 1st analog AGC loop formation -- PREF and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PREF) -- the receiving set according to claim 11 characterized by carrying out so that -Aa (PIF-B-PREF) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.
[Claim 14] It is the receiving set according to claim 2 which carries out [that detect signal level from I outputted from a rectangular detection means, and a Q signal, establish a 2nd level detection means output this 2nd detection data to an AGC control means, said AGC control means performs automatic gain control of a gain-control magnification means according to said 2nd detection data before reception synchronous acquisition, and after reception synchronous acquisition was made having performed said automatic gain control by I after a synchronous detection, and the Q signal, and] as the description.
[Claim 15] The convergence reference value of the 3rd AGC loop formation with which an AGC control means consists the 2nd detection data of PIF, a gain control magnification means, a rectangular detection means, the 2nd level detection means, and an AGC control means in the automatic gain control

performed before reception synchronous acquisition is set to PR3. - the difference of PIF-PR3 -- the receiving set according to claim 14 characterized by carrying out so that -A3 (PIF-PR3) of the gain control data which equalized about the value and carried out the multiplication of gain A3 of said 3rd AGC loop formation to this may be set to 0.

[Claim 16] The receiving set according to claim 14 characterized by detecting temperature, establishing a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and said AGC control means amending the temperature anomaly at the time of automatic gain control with said temperature coefficient.

[Claim 17] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- the 2nd detection data -- the convergence reference value of PIF and the 3rd AGC loop formation -- PR3 and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PR3) -- the receiving set according to claim 15 characterized by carrying out so that -A3 (PIF-B-PR3) of the gain control data which equalized about the value and carried out the multiplication of gain A3 of said 3rd AGC loop formation to this may be set to 0.

[Claim 18] An operation magnification means for an AGC control means to generate a reference signal and a change signal, and to output the differential signal of said reference signal and the detection signal outputted from the 2nd level detection means, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The 2nd analog AGC loop formation which consists of a gain control magnification means, a rectangular detection means, said 2nd level detection means, said operation magnification means, and said selection means is formed. The receiving set according to claim 2 or 16 characterized by performing automatic gain control by this 2nd analog AGC loop formation.

[Claim 19] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 2nd analog AGC loop formation -- PREF2 -- carrying out -- the difference of - (PIF-PREF2) -- the receiving set according to claim 18 characterized by carrying out so that -Aa (PIF-PREF2) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[Claim 20] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 2nd analog AGC loop formation -- PREF2 and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PREF2) -- the receiving set according to claim 18 characterized by carrying out so that -Aa (PIF-B-PREF2) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[Claim 21] A 1st gain control magnification means to amplify the received quadrature amplitude modulation signal, and a rectangular detection means to perform rectangular detection of said magnification signal, A 2nd gain control magnification means to amplify I and the Q signal which were obtained by said rectangular detection, An A/D-conversion means to change into a digital signal I and the Q signal which were amplified with this 2nd gain control magnification means, So that a correlation means to perform said digital I and correlation detection of a Q signal, a synchronous-detection means to take a synchronous detection from the correlation detection data of this correlation means, I after said synchronous detection, and a Q signal may become fixed The receiving set characterized by providing the AGC control means which performs automatic gain control of said 1st and 2nd gain control magnification means according to the I and Q signal.

[Claim 22] It is the receiving set according to claim 21 which signal level is detected from I outputted from the 2nd gain control magnification means, and a Q signal, a level detection means output this detection data to an AGC control means is established, and said AGC control means performs automatic gain control of a gain-control magnification means according to said detection data before reception synchronous acquisition, and is characterized by for after reception synchronous acquisition to perform said automatic gain control by I after a synchronous detection, and the Q signal.

[Claim 23] An AGC control means detection data for the automatic gain control performed before reception synchronous acquisition PIF, The convergence reference value of the 4th AGC loop formation which consists of the 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, a level detection means, and an AGC control means is set to PR4. - the difference of PIF-PR4 -- the receiving set according to claim 22 characterized by carrying out so that - A4 (PIF-PR4) of the gain control data which equalized about the value and carried out the multiplication of gain A4 of said 4th AGC loop formation to this may be set to 0.

[Claim 24] An AGC control means received electric-field level data for the automatic gain control performed after reception synchronous acquisition PB, The convergence reference value of the 5th AGC loop formation which consists of the 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, an A/D-conversion means, a correlation means, a synchronous-detection means, and an AGC control means is set to PR5. - the difference of PB-PR5 -- the receiving set according to claim 23 characterized by carrying out so that -A5 (PB-PR5) of the gain control data which equalized about the value and carried out the multiplication of gain A5 of said 5th AGC loop formation to this may be set to 0.

[Claim 25] The receiving set according to claim 21 or 22 characterized by detecting temperature, establishing a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and said AGC control means amending the temperature anomaly at the time of automatic gain control with said temperature coefficient.

[Claim 26] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- detection data -- the convergence reference value of PIF and the 4th AGC loop formation -- PR4 and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PR4) -- the receiving set according to claim 25 characterized by carrying out so that -A4 (PIF-B-PR4) of the gain control data which equalized about the value and carried out the multiplication of gain A4 of said 4th AGC loop formation to this may be set to 0.

[Claim 27] An AGC control means sets a temperature coefficient to B for the received electric-field level data asked for the automatic gain control performed after reception synchronous acquisition by said AGC control means by setting the convergence reference value of PB and the 5th AGC loop formation to PR5. - the difference of PB-B-PR5 -- the receiving set according to claim 26 characterized by carrying out so that -A5 (PB-B-PR5) of the gain control data which equalized about the value and carried out the multiplication of gain A5 of said 5th AGC loop formation to this may be set to 0.

[Claim 28] An operation magnification means for an AGC control means to generate a reference signal and a change signal, and to output the differential signal of said reference signal and the detection signal outputted from a level detection means, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, said level detection means, The receiving set according to claim 21 or 25 characterized by forming the 3rd analog AGC loop formation which consists of said operation magnification means and said selection means, and performing automatic gain control by this 3rd analog AGC loop formation.

[Claim 29] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 3rd analog AGC loop formation -- PREF3 -- carrying out -- the difference of - (PIF-PREF3) -- the receiving set according to claim 28 characterized by carrying out so that -Aa (PIF-PREF3) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[Claim 30] the automatic gain control which an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 3rd analog AGC loop formation -- PREF3 and a temperature coefficient -- B -- carrying out -- the difference of - (PIF-B-PREF3) -- the receiving set according to claim 28 characterized by carrying out so that -Aa (PIF-

B-PREF3) of the gain control signal which equalized about the value and carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.
[Claim 31] claim 1 to which an AGC control means is characterized by performing automatic gain control to the timing of the integral multiple of the symbol clock extracted from the synchronous-detection means thru/or claim 30 -- a receiving set given in either.
[Claim 32] claim 1 thru/or claim 31 -- the base station equipment characterized by providing the receiving set of a publication in either.
[Claim 33] claim 1 thru/or claim 31 -- the mobile station equipment characterized by providing the receiving set of a publication in either.
[Claim 34] claim 1 thru/or claim 31 -- the mobile communication system characterized by providing a receiving set given in either to base station equipment or mobile station equipment.
[Claim 35] The receiving approach characterized by amplifying the received quadrature amplitude modulation signal, performing correlation detection after changing into a digital signal I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal, and performing automatic gain control at the time of said magnification according to that I and Q signal so that I and the Q signal which are obtained by performing a synchronous detection after this correlation detection may become fixed.
[Claim 36] The receiving approach according to claim 35 characterized by judging a reception synchronization from I after a synchronous detection, and a Q signal, performing automatic gain control according to said detection result if this judgment result is before reception synchronous acquisition, and performing said automatic gain control according to I after a synchronous detection, and a Q signal if it is after reception synchronous acquisition while detecting the signal level of the intermediate frequency band after magnification.
[Claim 37] The receiving approach according to claim 35 or 36 characterized by amending the temperature anomaly at the time of automatic gain control according to the temperature coefficient which detected temperature and was obtained by this detection.
[Claim 38] The receiving approach according to claim 37 characterized by amending the received electric-field level which uses I after a synchronous detection, and a Q signal, and is called for by count of this square root of I2+Q2 after reception synchronous acquisition according to a temperature coefficient.
[Claim 39] The receiving approach according to claim 35 or 37 characterized by forming the 1st analog AGC loop formation which searches for the differential signal of the detection signal and reference signal by detection of the signal level of an intermediate frequency band by the differential amplifier operation, and performs automatic gain control with said differential signal before reception synchronous acquisition.
[Claim 40] It is the receiving approach according to claim 35 which signal level is detected from I obtained by carrying out rectangular detection, and a Q signal, and automatic gain control is performed according to the 2nd detection data based on said detection before reception synchronous acquisition, and is characterized by after reception synchronous acquisition performing said automatic gain control by I after a synchronous detection, and the Q signal.
[Claim 41] The receiving approach according to claim 40 characterized by amending the temperature anomaly at the time of automatic gain control according to the temperature coefficient which detected temperature and was obtained by this detection.
[Claim 42] The receiving approach according to claim 35 or 41 characterized by forming the 2nd analog AGC loop formation which searches for the differential signal of the detection signal and reference signal by I after rectangular detection, and detection of Q signal level by the differential amplifier operation, and performs automatic gain control with said differential signal before reception synchronous acquisition.
[Claim 43] Amplify the received quadrature amplitude modulation signal the 1st time, and I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal are amplified the 2nd time. The receiving approach characterized by performing correlation detection after

changing into a digital signal this I and Q signal that were amplified the 2nd time, and performing automatic gain control at the time of said 1st and 2nd magnification according to that I and Q signal so that I and the Q signal which are obtained by performing a synchronous detection after this correlation detection may become fixed.

[Claim 44] It is the receiving approach according to claim 43 which signal level is detected from I amplified the 2nd time and a Q signal, and automatic gain control is performed according to the detection data based on said detection before reception synchronous acquisition, and is characterized by after reception synchronous acquisition performing said automatic gain control by I after a synchronous detection, and the Q signal.

[Claim 45] The receiving approach according to claim 43 or 44 characterized by amending the temperature anomaly at the time of automatic gain control according to the temperature coefficient which detected temperature and was obtained by this detection.

[Claim 46] The receiving approach according to claim 43 or 45 characterized by forming the 3rd analog AGC loop formation which searches for the differential signal of the detection signal and reference signal by detection of I amplified the 2nd time and Q signal level by the differential amplifier operation, and performs automatic gain control with said differential signal before reception synchronous acquisition.

[Claim 47] claim 32 characterized by performing automatic gain control to the timing of the integral multiple of the symbol clock extracted from the synchronous-detection means thru/or claim 46 -- the reception approach given in either.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the receiving set and the receiving approach which applied the CDMA (Code Division Multiple Access) method used for digital mobile communications etc.
[0002]
[Description of the Prior Art] By the CDMA method, in the sending set of a base station, the signal modulated the 1st order is modulated the 2nd order with a diffusion signal, it transmits, and what correlation with the diffusion signal of the channel of choice is taken for (the back diffusion of electrons is carried out) extracts the target primary modulated wave in the receiving set of a mobile station.
[0003] In process of this back diffusion of electrons, the signal of other channels other than the channel of choice serves as a noise. Since the signal wave from a base station to a mobile station which it gets down and is made into the purpose by the circuit, and the other interference wave reach each mobile station in response to fluctuation similarly on a propagation path, the relation of the receiving level of the signal wave after the back diffusion of electrons in each mobile station and an interference wave becomes fixed.
[0004] however, by the going-up circuit from a mobile station to a base station, even if it transmits a signal wave with transmitted power with each same mobile station, the distance and the propagation environment from a mobile station to a base station differ from each other, respectively -- it comes out and the receiving level in the base station of each signal wave is different.
[0005] For this reason, in a base station, in order to restore to each signal wave correctly by the back diffusion of electrons, the receiving level of each signal wave must be arranged and transmitted power control of high degree of accuracy and an extensive dynamic range is needed for a mobile station. Moreover, in order to perform power control to each mobile station in a base station with high precision, it is necessary to measure the received electric-field level of a local station with high precision, and to report to a base station with a mobile station.
[0006] Drawing 19 shows the block diagram of the conventional receiving set. However, let this receiving set be a base station in digital mobile communication system, or the thing used a migration office.
[0007] The conventional receiving set 1900 shown in drawing 19 An antenna 1901 and the 1st band pass filter 1902, A low noise amplifier 1903, the down mixer 1904, and the 2nd band pass filter 1905, A gain control driver 1906, the rectangular wave detector 1907, and the 1st and 2nd low pass filters 1908 and 1909, It has 1st and 2nd A/D converters 1910 and 1911, the 1st and 2nd correlators 1912 and 1913, the synchronous-detection section 1914, the AGC (Automatic Gain Control) control section 1915, and D/A converter 1916, and is constituted.
[0008] In such a configuration, wave filtration only of the band necessary with a band pass filter 1902 is carried out, and low noise magnification of the quadrature amplitude modulation signal received with the antenna 1901 is carried out with a low noise amplifier 1903. Frequency conversion of this amplified

signal is carried out to IF frequency (intermediate frequency) with the down mixer 1904, and it is amplified with a gain control driver 1906.
[0009] This gain control driver 1906 is generated by the AGC control section 1915, and that gain is controlled according to the gain control signal supplied through D/A converter 1916. Control of this gain is performed so that the output level of A/D converters 1910 and 1911 may become fixed.
[0010] Thus, rectangular detection of the signal by which gain was amplified with the gain control driver 1906 by which adjustable control is carried out is carried out with the rectangular wave detector 1907, and I channel signaling (the following, I signal) and Q channel signaling (the following, Q signal) are acquired by this.
[0011] Low-pass wave filtration of I of an analog and the Q signal is carried out with low pass filters 1908 and 1909, and it is changed into a digital signal with A/D converters 1910 and 1911, and further, after correlation detection is carried out with correlators 1912 and 1913, a synchronous detection is carried out in the synchronous-detection section 1914, and I signal 1917 and Q signal 1918 are outputted by this.
[0012] Moreover, digital I and the Q signal which are outputted from A/D converters 1910 and 1911 are inputted into the AGC control section 1915, and they generate the received electric-field level data 1919 here while they generate the gain control data for controlling the gain of a gain control driver 1906 to D/A converter 1916 so that they I and the receiving level of a Q signal may become fixed.
[0013]
[Problem(s) to be Solved by the Invention] However, in conventional equipment, in order to calculate the receiving level detection for performing receiving gain control and received electric-field level detection by the AGC control section 1915 of the high-speed chip rate constituted by the digital circuit and to perform it from digital I outputted from A/D converters 1910 and 1911, and Q signal level, there is a problem that the consumed electric current by the high-speed operation becomes large.
[0014] This invention is made in view of this point, and it aims at offering the receiving set and the receiving approach of performing receiving gain control and received electric-field level detection by the low consumed electric current.
[0015]
[Means for Solving the Problem] It is a gain control magnification means, and this invention amplifies the received quadrature amplitude modulation signal, and is a rectangular detection means. Rectangular detection of that magnification signal is performed and I and the Q signal which were obtained by this rectangular detection are changed into a digital signal with an A/D-conversion means. With a correlation means So that that digital I and correlation detection of a Q signal may be performed, a synchronous detection may be taken with a synchronous-detection means from this correlation detection data and I after this synchronous detection and a Q signal may become fixed by the AGC control means By being made to perform automatic gain control of a gain control magnification means according to that I and Q signal, the consumed electric current of an AGC control means which automatic gain control according to I of the low-speed symbol rate after a synchronous detection and a Q signal is performed, and performs this automatic gain control was reduced.
[0016]
[Embodiment of the Invention] The 1st mode of this invention amplifies the received quadrature amplitude modulation signal, after it changes into a digital signal I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal, it performs correlation detection, and it takes the configuration possessing the function perform automatic gain control at the time of said magnification according to that I and Q signal so that I and the Q signal which are obtained by performing a synchronous detection after this correlation detection may become fixed.
[0017] According to this configuration, I and the Q signal which are obtained by performing a synchronous detection are low-speed SHIMBORURE-TO, and since automatic gain control is performed according to this I and Q signal, they can reduce the consumed electric current of a function which performs that automatic gain control.
[0018] A gain control magnification means to amplify the quadrature amplitude modulation signal with

which the 2nd mode of this invention was received, A rectangular detection means to perform rectangular detection of said magnification signal, and an A/D-conversion means to change into a digital signal I and the Q signal which were obtained by said rectangular detection, So that a correlation means to perform said digital I and correlation detection of a Q signal, a synchronous-detection means to take a synchronous detection from the correlation detection data of this correlation means, I after said synchronous detection, and a Q signal may become fixed The configuration possessing the AGC control means which performs automatic gain control of said gain control magnification means according to the I and Q signal is taken.

[0019] According to this configuration, I after a synchronous detection and a Q signal are low-speed SHIMBORURE-TO, and since automatic gain control is performed according to this I and Q signal, the consumed electric current of an AGC control means which performs that automatic gain control can be reduced.

[0020] The 3rd mode of this invention detects the signal level of the intermediate-frequency band outputted from a gain-control magnification means in the 2nd mode, a level detection means output this detection data to an AGC control means establishes, and the configuration to which said AGC control means carries out said automatic gain control by I after a synchronous detection and the Q signal after reception synchronous acquisition by performing automatic gain control of said gain-control magnification means according to said detection data before reception synchronous acquisition takes.

[0021] Since according to this configuration automatic gain control is performed before reception synchronous acquisition according to the detection data of the signal level of an intermediate frequency band and automatic gain control is performed after reception synchronous acquisition according to I of low-speed SHIMBORURE-TO after a synchronous detection, and a Q signal, the consumed electric current of an AGC control means which performs that automatic gain control can be reduced.

[0022] Moreover, in the condition that there is no correlation output signal before reception synchronous acquisition, by performing gain control of a gain control magnification means using the detection data of an intermediate frequency band, the saturation of the input signal to the A/D-conversion means before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.

[0023] The 4th mode of this invention the automatic gain control which an AGC control means performs before reception synchronous acquisition in the 3rd mode The convergence reference value of the 1st AGC loop formation which consists detection data of PIF, a gain control magnification means, a level detection means, and an AGC control means is set to PR1. - the difference of PIF-PR1 -- equalize about a value and take the configuration performed so that -A1 (PIF-PR1) of the gain control data which carried out the multiplication of the gain A1 of said 1st AGC loop formation to this may be set to 0.

[0024] According to this configuration, since automatic gain control is performed before reception synchronous acquisition according to the detection data of the signal level of an intermediate frequency band, the consumed electric current of an AGC control means which performs that automatic gain control can be reduced.

[0025] Moreover, in the condition that there is no correlation output signal before reception synchronous acquisition, by performing gain control of a gain control magnification means using the detection data of an intermediate frequency band, the saturation of the input signal to the A/D-conversion means before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.

[0026] When an AGC control means uses I after a synchronous detection, and a Q signal after reception synchronous acquisition and the 5th mode of this invention calculates this square root of I2+Q2 in the 3rd mode, the configuration which obtains received electric-field level data is taken.

[0027] According to this configuration, received electric-field level can be correctly obtained by the AGC control means after reception synchronous acquisition.

[0028] The 6th mode of this invention the automatic gain control which an AGC control means performs after reception synchronous acquisition in the 5th mode The convergence reference value of the 2nd AGC loop formation which consists received electric-field level data of PB, a gain control magnification means, a rectangular detection means, an A/D-conversion means, a correlation means, a synchronous-detection means, and an AGC control means is set to PR2. - the difference of PB-PR2 --

equalize about a value and take the configuration performed so that -A2 (PB-PR2) of the gain control data which carried out the multiplication of the gain A2 of said 2nd AGC loop formation to this may be set to 0.

[0029] According to this configuration, since automatic gain control is performed after reception synchronous acquisition according to I of low-speed SHIMBORURE-TO after a synchronous detection, and a Q signal, the consumed electric current of an AGC control means which performs that automatic gain control can be reduced.

[0030] In the 2nd mode or 3rd mode, the 7th mode of this invention detects temperature, establishes a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and takes the configuration in which said AGC control means amends the temperature anomaly at the time of automatic gain control with said temperature coefficient.

[0031] According to this configuration, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0032] The 8th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for detection data in the 7th mode by setting the convergence reference value of PIF and the 1st AGC loop formation to PR1. - the difference of PIF-B-PR1 -- equalize about a value and take the configuration performed so that -A1 (PIF-B-PR1) of the gain control data which carried out the multiplication of the gain A1 of said 1st AGC loop formation to this may be set to 0.

[0033] According to this configuration, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0034] The configuration in which the 9th mode of this invention amends the received electric-field level data which an AGC control means uses I after a synchronous detection and a Q signal after reception synchronous acquisition, and are called for by count of this square root of I2+Q2 in the 7th mode according to a temperature coefficient is taken.

[0035] According to this configuration, even when the temperature of a receiving set changes, the detection precision of received electric-field level can be compensated.

[0036] The 10th mode of this invention sets [the automatic gain control which an AGC control means performs after reception synchronous acquisition] a temperature coefficient to B for received electric-field level data in the 9th mode by setting the convergence reference value of PB and the 2nd AGC loop formation to PR2. - the difference of PB-B-PR2 -- equalize about a value and take the configuration performed so that -A2 (PB-B-PR2) of the gain control data which carried out the multiplication of the gain A2 of said 2nd AGC loop formation to this may be set to 0.

[0037] According to this configuration, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0038] An operation magnification means by which an AGC control means generates a reference signal and a change signal, and, as for the 11th mode of this invention, outputs the differential signal of said reference signal and the detection signal outputted from a level detection means in the 2nd mode or 7th mode, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The 1st analog AGC loop formation which consists of said gain control magnification means, said level detection means, said operation magnification means, and said selection means is formed, and the configuration which performs automatic gain control by this 1st analog AGC loop formation is taken.

[0039] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 1st analog AGC loop formation according to this configuration, automatic gain control can be performed at high speed and simply.

[0040] the 12th mode of this invention -- the 11th voice -- the automatic gain control which sets like and an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 1st analog AGC loop formation -- PREF -- carrying out -- the difference of - (PIF-PREF) -- it equalizes about a value and the configuration performed so that -Aa

(PIF-PREF) of the gain control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0 is taken.

[0041] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 1st analog AGC loop formation according to this configuration, automatic gain control can be performed at high speed and simply.

[0042] The 13th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for a detection signal in the 11th mode by setting the convergence reference value of PIF and a 1st analog AGC loop formation to PREF. - the difference of PIF-B-PREF -- equalize about a value and take the configuration performed so that -Aa (PIF-B-PREF) of the gain control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[0043] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 1st analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0044] The 14th mode of this invention detects signal level in the 2nd mode from I outputted from a rectangular detection means, and a Q signal, a 2nd level detection means output this 2nd detection data to an AGC control means establishes, said AGC control means performs the automatic gain control of a gain-control magnification means according to said 2nd detection data before reception synchronous acquisition, and after reception synchronous acquisition takes the configuration which performs said automatic gain control by I after a synchronous detection, and the Q signal.

[0045] Since the 2nd detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, a signal-to-noise ratio may come to compare with intermediate frequency detection, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0046] The 15th mode of this invention is set in the 14th mode. An AGC control means The convergence reference value of the 3rd AGC loop formation which consists the 2nd detection data of PIF, a gain control magnification means, a rectangular detection means, the 2nd level detection means, and an AGC control means in the automatic gain control performed before reception synchronous acquisition is set to PR3. - the difference of PIF-PR3 -- equalize about a value and take the configuration performed so that -A3 (PIF-PR3) of the gain control data which carried out the multiplication of gain A3 of said 3rd AGC loop formation to this may be set to 0.

[0047] Since the 2nd detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, a signal-to-noise ratio may come to compare with intermediate frequency detection, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0048] In the 14th mode, the 16th mode of this invention detects temperature, establishes a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and takes the configuration in which said AGC control means amends the temperature anomaly at the time of automatic gain control with said temperature coefficient.

[0049] According to this configuration, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0050] The 17th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for the 2nd detection data in the 15th mode by setting the convergence reference value of PIF and the 3rd AGC loop formation to PR3. - the difference of PIF-B-PR3 -- equalize about a value and take the configuration performed so that -A3 (PIF-B-PR3) of the gain control data which carried out the multiplication of gain A3 of said 3rd AGC loop formation to this may be set to 0.

[0051] Since the 2nd detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, a signal-to-noise ratio may come to compare with intermediate frequency detection, and even when automatic gain control can be performed with a sufficient precision and the temperature of a receiving set changes also at the time of low reception input electric field, the precision of automatic gain control can be compensated.

[0052] An operation magnification means by which an AGC control means generates a reference signal and a change signal, and, as for the 18th mode of this invention, outputs the differential signal of said reference signal and the detection signal outputted from the 2nd level detection means in the 2nd mode or 16th mode, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The 2nd analog AGC loop formation which consists of a gain control magnification means, a rectangular detection means, said 2nd level detection means, said operation magnification means, and said selection means is formed, and the configuration which performs automatic gain control by this 2nd analog AGC loop formation is taken.

[0053] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 2nd analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0054] the 19th mode of this invention -- the 18th voice -- the automatic gain control which sets like and an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 2nd analog AGC loop formation -- PREF2 -- carrying out -- the difference of - (PIF-PREF2) -- it equalizes about a value and the configuration performed so that -Aa (PIF-PREF2) of the gain-control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0 is taken.

[0055] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 2nd analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0056] The 20th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for a detection signal in the 18th mode, setting the convergence reference value of PIF and a 2nd analog AGC loop formation as PREF2. - the difference of PIF-B-PREF2 -- equalize about a value and take the configuration performed so that -Aa (PIF-B-PREF2) of the gain control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[0057] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 2nd analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0058] A 1st gain control magnification means to amplify the quadrature amplitude modulation signal with which the 21st mode of this invention was received, A rectangular detection means to perform rectangular detection of said magnification signal, and a 2nd gain control magnification means to amplify I and the Q signal which were obtained by said rectangular detection, An A/D-conversion means to change into a digital signal I and the Q signal which were amplified with this 2nd gain control magnification means, So that a correlation means to perform said digital I and correlation detection of a Q signal, a synchronous-detection means to take a synchronous detection from the correlation detection data of this correlation means, I after said synchronous detection, and a Q signal may become fixed The configuration possessing the AGC control means which performs automatic gain control of said 1st and 2nd gain control magnification means according to the I and Q signal is taken.

[0059] According to this configuration, since the consumed electric current at the time of the automatic gain control of the 1st gain control magnification means in the input side of a rectangular detection means decreases, and the automatic gain control in the output side of a rectangular detection means has the small consumed electric current and it ends by performing automatic gain control also with the 2nd gain control magnification means of the output side of a rectangular detection means, the consumed electric current in the whole receiving set can be decreased further.

[0060] The 22nd mode of this invention detects signal level in the 21st mode from I outputted from the 2nd gain-control magnification means, and a Q signal, a level detection means output this detection data to an AGC control means establishes, and the configuration to which said AGC control means carries out said automatic gain control by I after a synchronous detection and the Q signal after reception synchronous acquisition by performing automatic gain control of a gain-control magnification means according to said detection data before reception synchronous acquisition takes.

[0061] Since the detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, a signal-to-noise ratio may come to compare with intermediate frequency detection, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0062] The 23rd mode of this invention is set in the 22nd mode. An AGC control means The convergence reference value of the 4th AGC loop formation which consists detection data of PIF, the 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, a level detection means, and an AGC control means in the automatic gain control performed before reception synchronous acquisition is set to PR4. - the difference of PIF-PR4 -- equalize about a value and take the configuration performed so that -A4 (PIF-PR4) of the gain control data which carried out the multiplication of gain A4 of said 4th AGC loop formation to this may be set to 0.

[0063] Since the detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, a signal-to-noise ratio may come to compare with intermediate frequency detection, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0064] The 24th mode of this invention is set in the 23rd mode. An AGC control means For the automatic gain control performed after reception synchronous acquisition, received electric-field level data PB, The convergence reference value of the 5th AGC loop formation which consists of the 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, an A/D-conversion means, a correlation means, a synchronous-detection means, and an AGC control means is set to PR5. - the difference of PB-PR5 -- equalize about a value and take the configuration performed so that -A5 (PB-PR5) of the gain control data which carried out the multiplication of gain A5 of said 5th AGC loop formation to this may be set to 0.

[0065] According to this configuration, since the consumed electric current at the time of the automatic gain control of the 1st gain control magnification means in the input side of a rectangular detection means decreases, and the automatic gain control in the output side of a rectangular detection means has the small consumed electric current and it ends, the consumed electric current in the whole receiving set can be decreased further.

[0066] In the 21st mode or 22nd mode, the 25th mode of this invention detects temperature, establishes a temperature detection means to output the temperature coefficient obtained by this detection to an AGC control means, and takes the configuration in which said AGC control means amends the temperature anomaly at the time of automatic gain control with said temperature coefficient.

[0067] According to this configuration, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0068] The 26th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for detection data in the 25th mode by setting the convergence reference value of PIF and the 4th AGC loop formation to PR4. - the difference of PIF-B-PR4 -- equalize about a value and take the configuration performed so that -A4 (PIF-B-PR4) of the gain control data which carried out the multiplication of gain A4 of said 4th AGC loop formation to this may be set to 0.

[0069] Since the detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this configuration, while a signal-to-noise ratio may come to compare with intermediate frequency detection and being able to perform automatic gain control with a sufficient precision also at the time of low reception input electric field, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0070] The 27th mode of this invention is set in the 26th mode. An AGC control means A temperature coefficient is set to B for the received electric-field level data asked for the automatic gain control performed after reception synchronous acquisition by said AGC control means by setting the convergence reference value of PB and the 5th AGC loop formation to PR5. - the difference of PB-B-PR5 -- equalize about a value and take the configuration performed so that -A5 (PB-B-PR5) of the gain control data which carried out the multiplication of gain A5 of said 5th AGC loop formation to this may be set to 0.

[0071] Since the automatic gain control in the output side of a rectangular detection means has the small consumed electric current and it ends, while according to this configuration the consumed electric current at the time of the automatic gain control of the 1st gain control magnification means in the input side of a rectangular detection means decreases, and being able to decrease further the consumed electric current in the whole receiving set, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0072] The 28th mode of this invention is set in the 21st mode or 25th mode. An operation magnification means for an AGC control means to generate a reference signal and a change signal, and to output the differential signal of said reference signal and the detection signal outputted from a level detection means, By having a selection means to choose said differential signal or said gain control data according to said change signal, and generating said change signal for said selection means choosing said differential signal from said AGC control means before reception synchronous acquisition The 3rd analog AGC loop formation which consists of the 1st gain control magnification means, a rectangular detection means, the 2nd gain control magnification means, said level detection means, said operation magnification means, and said selection means is formed, and the configuration which performs automatic gain control by this 3rd analog AGC loop formation is taken.

.[0073] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 3rd analog AGC loop formation according to this configuration, automatic gain control can be performed at high speed and simply.

[0074] the 29th mode of this invention -- the 28th voice -- the automatic gain control which sets like and an AGC control means performs before reception synchronous acquisition -- a detection signal -- the convergence reference value of PIF and a 3rd analog AGC loop formation -- PREF3 -- carrying out -- the difference of - (PIF-PREF3) -- it equalizes about a value and the configuration performed so that -Aa (PIF-PREF3) of the gain-control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0 is taken.

[0075] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 3rd analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0076] The 30th mode of this invention sets [the automatic gain control which an AGC control means performs before reception synchronous acquisition] a temperature coefficient to B for a detection signal in the 28th mode, setting the convergence reference value of PIF and a 3rd analog AGC loop formation as PREF3. - the difference of PIF-B-PREF3 -- equalize about a value and take the configuration performed so that -Aa (PIF-B-PREF3) of the gain control signal which carried out the multiplication of the gain Aa of said operation magnification means to this may be set to 0.

[0077] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 3rd analog AGC loop formation according to this configuration, while being able to carry out simply, a high speed and even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated for automatic gain control.

[0078] The 31st mode of this invention takes the configuration to which an AGC control means carries out automatic gain control to the timing of the integral multiple of the symbol clock extracted from the synchronous-detection means in one of the 1st mode thru/or 30th mode.

[0079] Since according to this configuration the receive section within 1 symbol time amount, i.e., the gain of an automatic gain magnification means, becomes fixed and after reception synchronous acquisition does not have degradation of the correlation property by gain fluctuation within 1 symbol time amount, a good correlation property can be acquired.

[0080] The 32nd mode of this invention takes the configuration which possesses the receiving set of a publication to base station equipment at one of the 1st mode thru/or 31st mode.

[0081] According to this configuration, the operation effectiveness as the 1st mode thru/or one of the 31st modes that base station equipment is the same can be acquired.

[0082] The 33rd mode of this invention takes the configuration which possesses the receiving set of a publication to mobile station equipment at one of the 1st mode thru/or 31st mode.

[0083] According to this configuration, the operation effectiveness as the 1st mode thru/or one of the 31st modes that mobile station equipment is the same can be acquired.

[0084] The 34th mode of this invention takes the configuration which possesses the receiving set of a publication to base station equipment or mobile station equipment at one of the 1st mode thru/or 31st mode in mobile communication system.

[0085] According to this configuration, the operation effectiveness as the 1st mode thru/or one of the 31st modes that the base station equipment or mobile station equipment in mobile communication system is the same can be acquired.

[0086] The 35th mode of this invention amplifies the received quadrature amplitude modulation signal, after it changes into a digital signal I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal, it performs correlation detection, and it was made to perform automatic gain control at the time of said magnification according to that I and Q signal so that I and the Q signal which are obtained by performing a synchronous detection after this correlation detection might become fixed.

[0087] According to this approach, I and the Q signal which are obtained by performing a synchronous detection are low-speed SHIMBORURE-TO, and since automatic gain control is performed according to this I and Q signal, they can reduce the consumed electric current in the case of performing that automatic gain control.

[0088] In the 35th mode, when it was after reception synchronous acquisition, it was made for the 36th mode of this invention to have judged the reception synchronization from I after a synchronous detection, and a Q signal, to have performed automatic gain control according to said detection result, when this judgment result was before reception synchronous acquisition, and to perform said automatic gain control according to I after a synchronous detection, and a Q signal, while detecting the signal level of the intermediate frequency band after magnification.

[0089] Since according to this approach automatic gain control is performed before reception synchronous acquisition according to the detection data of the signal level of an intermediate frequency band and automatic gain control is performed after reception synchronous acquisition according to I of low-speed SHIMBORURE-TO after a synchronous detection, and a Q signal, the consumed electric current in the case of performing that automatic gain control can be reduced.

[0090] Moreover, in the condition that there is no correlation output signal before reception synchronous acquisition, by performing automatic gain control using the detection data of an intermediate frequency band, the saturation of the input signal at the time of changing into the digital signal before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.

[0091] In the 35th mode or 36th mode, the 37th mode of this invention detects temperature and amended the temperature anomaly at the time of automatic gain control according to the temperature coefficient obtained by this detection.

[0092] According to this approach, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0093] In the 37th mode, I after a synchronous detection and a Q signal are used for the 38th mode of this invention after reception synchronous acquisition, and it amended the received electric-field level called for by count of this square root of I2+Q2 according to the temperature coefficient.

[0094] According to this approach, even when the temperature of a receiving set changes, the detection precision of received electric-field level can be compensated.

[0095] In the 35th mode or 37th mode, the 39th mode of this invention searches for the differential signal of the detection signal and reference signal by detection of the signal level of an intermediate frequency band by the differential amplifier operation before reception synchronous acquisition, and formed the 1st analog AGC loop formation which performs automatic gain control with said differential signal.

[0096] Since it is not necessary to mind processing of the automatic gain control which used the detection data of an intermediate frequency band by performing automatic gain control before synchronous acquisition by the 1st analog AGC loop formation according to this approach, automatic gain control can be performed at high speed and simply.

[0097] The 40th mode of this invention detects signal level from I obtained by carrying out rectangular detection in the 35th mode, and a Q signal, automatic gain control is performed according to the 2nd detection data based on said detection before reception synchronous acquisition, and after reception synchronous acquisition was made to perform said automatic gain control by I after a synchronous detection, and the Q signal.

[0098] Since the 2nd detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this approach, a signal-to-noise ratio may come to compare with intermediate frequency detection 34th given in a mode, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0099] In the 40th mode, the 41st mode of this invention detects temperature and amended the temperature anomaly at the time of automatic gain control according to the temperature coefficient obtained by this detection.

[0100] According to this approach, even when the temperature of a receiving set changes, the detection precision of received electric-field level can be compensated.

[0101] In the 35th mode or 41st mode, the 42nd mode of this invention searches for the differential signal of the detection signal and reference signal by I after rectangular detection, and detection of Q signal level by the differential amplifier operation before reception synchronous acquisition, and formed the 2nd analog AGC loop formation which performs automatic gain control with said differential signal.

[0102] Since it is not necessary to mind processing of the automatic gain control which used the detection data of an intermediate frequency band by performing automatic gain control before synchronous acquisition by the 2nd analog AGC loop formation according to this approach, automatic gain control can be performed at high speed and simply.

[0103] The 43rd mode of this invention amplifies the received quadrature amplitude modulation signal the 1st time. Correlation detection is performed, after amplifying I and the Q signal which are obtained by carrying out rectangular detection of this magnification signal the 2nd time and changing into a digital signal this I and Q signal that were amplified the 2nd time. According to that I and Q signal, it was made to perform automatic gain control at the time of said 1st and 2nd magnification so that I and the Q signal which are obtained by performing a synchronous detection after this correlation detection might become fixed.

[0104] According to this approach, since the consumed electric current at the time of the automatic gain control of the 1st magnification in the input side of a rectangular detection means decreases, and the automatic gain control in the output side of a rectangular detection means has the small consumed electric current and it ends when the 2nd magnification of the output side of a rectangular detection means also performs automatic gain control, the consumed electric current in the whole receiving set can be decreased further.

[0105] The 44th mode of this invention detects signal level from I amplified the 2nd time and a Q signal in the 43rd mode, automatic gain control is performed according to the detection data based on said detection before reception synchronous acquisition, and after reception synchronous acquisition was made to perform said automatic gain control by I after a synchronous detection, and the Q signal.

[0106] Since the detection data which detected and obtained I after rectangular detection and the level of a Q signal before reception synchronous acquisition were made to perform automatic gain control according to this approach, a signal-to-noise ratio may come to compare with intermediate frequency detection, and automatic gain control can be performed with a sufficient precision also at the time of low reception input electric field.

[0107] In the 43rd mode or 44th mode, the 45th mode of this invention detects temperature and amended the temperature anomaly at the time of automatic gain control according to the temperature coefficient obtained by this detection.

[0108] According to this approach, even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0109] In the 43rd mode or 45th mode, the 46th mode of this invention searches for the differential signal of the detection signal and reference signal by detection of I amplified the 2nd time before reception synchronous acquisition, and Q signal level by the differential amplifier operation, and formed the 3rd analog AGC loop formation which performs automatic gain control with said differential signal.

[0110] Since it is not necessary to mind processing by the AGC control means by performing automatic gain control before synchronous acquisition by the 3rd analog AGC loop formation according to this approach, automatic gain control can be performed at high speed and simply.

[0111] The 47th mode of this invention was made to perform automatic gain control to the timing of the integral multiple of the symbol clock extracted from the synchronous-detection means in one of the 32nd mode thru/or 46th mode.

[0112] Since according to this approach the receive section within 1 symbol time amount, i.e., the gain of an automatic gain magnification means, becomes fixed and after reception synchronous acquisition does not have degradation of the correlation property by gain fluctuation within 1 symbol time amount, a good correlation property can be acquired.

[0113] Hereafter, the gestalt of operation of this invention is explained to a detail with reference to a drawing.

[0114] (Gestalt 1 of operation) Drawing 1 shows the block diagram of the receiving set concerning the gestalt 1 of operation of this invention. However, this receiving set shall be used for the base station or mobile station in digital mobile communication system.

[0115] In the receiving set with which the description of the gestalt 1 of operation performs receiving gain control and received electric-field level detection, the signal level of IF frequency band performs AGC control before reception synchronous acquisition, and after reception synchronous acquisition is in the point of having been made to perform AGC control by I in low-speed SHIMBORURE-TO after a synchronous detection, and the Q signal.

[0116] The receiving set 100 of the gestalt 1 of operation shown in drawing 1 An antenna 101, the 1st band pass filter 102, and a low noise amplifier 103, The down mixer 104, the 2nd band pass filter 105, and a gain control driver 106, The rectangular wave detector 107 and the 1st and 2nd low pass filters 108,109, It has 1st and 2nd A/D converters 110,111, the 1st and 2nd correlators 112,113, the synchronous-detection section 114, the AGC control section 115, D/A converter 116, the level wave detector 117, and 3rd A/D converter 118, and is constituted.

[0117] In such a configuration, wave filtration only of the band necessary with a band pass filter 102 is carried out, and low noise magnification of the quadrature amplitude modulation signal received with the antenna 101 is carried out with a low noise amplifier 103. Frequency conversion of this amplified signal is carried out to IF frequency with the down mixer 104, and it is amplified with a gain control driver 106.

[0118] That gain is controlled according to the gain control data 120 generated from the AGC control section 115 which explains this gain control driver 106 by the after-mentioned through D/A converter 116. Control of this gain is performed so that the level of I outputted from the synchronous-detection section 114 and a Q signal may become fixed.

[0119] Thus, rectangular detection of the signal by which gain was amplified with the gain control driver 106 by which adjustable control is carried out is carried out with the rectangular wave detector 107, and I and a Q signal are obtained by this. Low-pass wave filtration of I of this analog and the Q signal is carried out with a low pass filter 108,109, and they are changed into a digital signal with A/D converter 110,111, and further, after correlation detection is carried out with correlator 112,113, the synchronous detection of them is carried out in the synchronous-detection section 114, and they are outputted to the AGC control section 115.

[0120] Moreover, the level of the signal amplified with the gain control driver 106 is detected with the level wave detector 117, and after this detection signal is changed into the detection data 121 with A/D converter 118, it is outputted to the AGC control section 115.

[0121] Next, actuation of the AGC control section 115 is explained. The AGC control section 115 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition (i.e., the condition of having not detected the reception synchronization), based on the detection data 121 of the level wave detector 117 inputted through A/D converter 118.

[0122] When the detection data 121 are set to PIF here and the convergence reference value of the 1st AGC loop formation which consists of a gain control driver 106, the level wave detector 117, A/D converter 118, the AGC control section 115, and D/A converter 116 is set to PR1, It equalizes about a value. the AGC control section 115 -- the difference of - (PIF-PR1) -- By carrying out the multiplication of the loop gain A1 of the 1st AGC loop formation to this, the gain control data 120 are generated and it controls to be set to -A1(PIF-PR1) =0 by this generated gain control data 120.

[0123] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0124] The received electric-field level data 122 are set to PB here. When the convergence reference value of the 2nd AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 108,109, A/D converter 110,111, correlator 112,113, the synchronous-detection section 114, the AGC control section 115, and D/A converter 116 is set to PR2, the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 of the 2nd AGC loop formation to this, and it controls to be set to -A2(PB-PR2) =0.

[0125] Thus, according to the receiving set 100 of the gestalt 1 of operation, the 1st AGC loop formation which consists of a gain control driver 106, the level wave detector 117, A/D converter 118, the AGC control section 115, and D/A converter 116 is constituted. Since the signal level of IF frequency band performs AGC control before reception synchronous acquisition and after reception synchronous acquisition was made to perform AGC control by I of low-speed SHIMBORURE-TO after a synchronous detection, and the Q signal The consumed electric current at the time of the receiving level detection after the synchronous acquisition in the AGC control section 115 which consists of digital circuits can be reduced.

[0126] Moreover, in the condition that there is no correlation output signal before synchronous acquisition, by carrying out gain control of a gain control driver 106 using the detection data 121 of IF frequency detected with the level wave detector 117, the saturation of the input signal to A/D converter 110,111 before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.

[0127] (Gestalt 2 of operation) Drawing 2 shows the block diagram of the receiving set concerning the gestalt 2 of operation of this invention. However, in the gestalt 2 of operation shown in this drawing 2 , the same sign is given to the part corresponding to each part of the gestalt 1 of operation of drawing 1 , and that explanation is omitted.

[0128] In addition to the configuration of the receiving set 100 of the gestalt 1 of operation, the description of the receiving set 200 of the gestalt 2 of operation shown in drawing 2 is equipped with the temperature sensor 201 which measures the temperature of an equipment circuit, and A/D converter 202 which changes into a digital signal the temperature signal of the analog detected with the temperature sensor 201, and is that it amended the gain control data 120 of the AGC control section 204 according to the temperature data 203 outputted from A/D converter 202.

[0129] In such a configuration, the AGC control section 204 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition according to the detection data 121. the time of setting the detection data 121 to PIF here, and setting the convergence reference value of the 1st AGC loop formation to PR1 -- the AGC control section 115 -- the difference of - (PIF-PR1) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A1 to this, and it controls to be set to -A1(PIF-PR1) =0 by this generated gain control data 120.

[0130] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR1 is used as a convergence reference value. It controls by this to be set to -A1(PIF-B-PR1) =0.

[0131] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0132] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 2nd AGC loop formation to PR2 -- the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 to this, and it controls to be set to -A2(PB-PR2) =0.

[0133] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0134] Thus, according to the receiving set 200 of the gestalt 2 of operation, since the temperature data 203 amended the gain control data 120 of the AGC control section 204, even when the circuit temperature of a receiving set 200 changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0135] (Gestalt 3 of operation) Drawing 3 shows the block diagram of the receiving set concerning the gestalt 3 of operation of this invention. However, in the gestalt 3 of operation shown in this drawing 3 , the same sign is given to the part corresponding to each part of the gestalt 2 of operation of drawing 2 , and that explanation is omitted.

[0136] The description of the receiving set 300 of the gestalt 3 of operation shown in drawing 3 D/A converter 303 which changes into an analog signal the criteria data 302 generated by the AGC control section 301 in addition to the configuration of the receiving set 200 of the gestalt 2 of operation, the output signal of the level wave detector 117 and D/A converter 303 -- difference -- with the error amplifier 304 to detect The low pass filter 305 which carries out low-pass wave filtration of the output signal of the error amplifier 304, According to the change signal 306 generated by the AGC control section 301, it has the circuit changing switch 307 changed so that it may choose any of the output signal of a low pass filter 305, and the output signal of D/A converter 116 they are. It is in the point which was made to control the gain control driver 106 before synchronous acquisition by the loop formation of an analog signal.

[0137] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 307 may choose a low pass filter 305 with the change signal 306 outputted from the AGC control section 301, and it constitutes the 1st analog AGC loop formation which consists of a gain control driver 106, the level wave detector 117, the error amplifier 304, a low pass filter 305, and a circuit changing switch 307.

[0138] This 1st analog AGC loop formation operates as follows. To the reference signal (referred to as PREF) from which the criteria data 302 outputted from the AGC control section 301 were changed into the analog signal with D/A converter 303, a 1st analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 117 may be set to -Aa(PIF-PREF) =0. Aa is the gain in the error amplifier 304 here.

[0139] At this time, B-PREF which carried out the multiplication of the temperature coefficient B by the temperature data 203 to the criteria data 302 outputted from the AGC control section 301 is used as a convergence reference value. It controls by this to be set to -Aa(PIF-B-PREF) =0.

[0140] Moreover, the AGC control section 301 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0141] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 2nd AGC loop formation to PR2 -- the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 to this, and it controls to be set to -A2(PB-PR2) =0.

[0142] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0143] Thus, since it is not necessary to mind processing with the AGC controller 301 and D/A converter 116 by controlling the gain control driver 106 before synchronous acquisition by the 1st analog AGC loop formation according to the receiving set 300 of the gestalt 3 of operation, loop control of automatic gain can be performed at high speed and simply.

[0144] (Gestalt 4 of operation) Drawing 4 shows the block diagram of the receiving set concerning the gestalt 4 of operation of this invention. However, in the gestalt 4 of operation shown in this drawing 4 , the same sign is given to the part corresponding to each part of the gestalt 1 of operation of drawing 1 , and that explanation is omitted.

[0145] Instead of the level wave detector 117 in the receiving set 100 of the gestalt 1 of operation, from the output I and Q signal of a low pass filter 108,109, the description of the receiving set 400 of the gestalt 4 of operation shown in drawing 4 detects signal level, and is in the point it was made to output this detection signal to the AGC control section 115 as detection data 121 through A/D converter 118.

[0146] In such a configuration, the AGC control section 115 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition based on the detection data 121 of the level wave detector 401 inputted through A/D converter 118.

[0147] The detection data 121 are set to PIF here. When the convergence reference value of the 3rd AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116 is set to PR3, the AGC control section 115 - the difference of PIF-PR3 -- equalize about a value, generate the gain control data 120 by carrying out the multiplication of loop gain A3 to this, and control to be set to -A3(PIF-PR3) =0 by this generated gain control data 120.

[0148] Next, the AGC control section 115 calculates received electric-field level from this square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this. the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 2nd AGC loop formation to PR2 -- the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 to this, and it controls to be set to -A2(PB-PR2) =0.

[0149] Thus, according to the receiving set 400 of the gestalt 4 of operation, the 3rd AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116 is constituted. Since the level of I outputted from the rectangular wave detector 107 before reception synchronous acquisition and a Q signal was made to perform AGC control, it may come to compare with IF frequency detection in case a signal-to-noise ratio is the gestalt 1 of operation, and AGC control can be performed with a sufficient precision also at the time of low reception input electric field.

[0150] (Gestalt 5 of operation) Drawing 5 shows the block diagram of the receiving set concerning the gestalt 5 of operation of this invention. However, in the gestalt 5 of operation shown in this drawing 5 , the same sign is given to the part corresponding to each part of the gestalt 4 of operation of drawing 4 , and that explanation is omitted.

[0151] In addition to the configuration of the receiving set 400 of the gestalt 4 of operation, the description of the receiving set 500 of the gestalt 5 of operation shown in drawing 5 is equipped with the temperature sensor 501 which measures the temperature of an equipment circuit, and A/D converter 502 which changes into a digital signal the temperature signal of the analog detected with the temperature sensor 501, and is that it amended the gain control data 120 of the AGC control section 504 according to the temperature data 503 outputted from A/D converter 502.

[0152] In such a configuration, the AGC control section 504 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition according to the detection data 121. the time of setting the detection data 121 to PIF here, and setting the convergence reference value of the 3rd AGC loop formation to PR3 -- the AGC control section 115 -- the difference of - (PIF-PR3) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A3 to this, and it controls to be set to -A3(PIF-PR3) =0 by this generated gain control data 120.

[0153] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 3, and B-PR3 is used as a convergence reference value. It controls by this to be set to -A3(PIF-B-PR3) =0.

[0154] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e.; reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0155] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 2nd AGC loop formation to PR2 -- the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 to this, and it controls to be set to -A2(PB-PR2) =0.

[0156] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0157] Thus, since according to the receiving set 500 of the gestalt 5 of operation the same effectiveness as the gestalt 4 of operation was acquired and also the temperature data 503 amended the gain control data 120 of the AGC control section 504, even when the circuit temperature of a receiving set 500 changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0158] (Gestalt 6 of operation) Drawing 6 shows the block diagram of the receiving set concerning the gestalt 6 of operation of this invention. However, in the gestalt 6 of operation shown in this drawing 6 , the same sign is given to the part corresponding to each part of the gestalt 5 of operation of drawing 5 , and that explanation is omitted.

[0159] The description of the receiving set 600 of the gestalt 6 of operation shown in drawing 6 D/A converter 603 which changes into an analog signal the criteria data 602 generated by the AGC control section 601 in addition to the configuration of the receiving set 500 of the gestalt 5 of operation, the output signal of the level wave detector 401 and D/A converter 603 -- difference -- with the error amplifier 604 to detect The low pass filter 605 which carries out low-pass wave filtration of the output signal of the error amplifier 604, According to the change signal 606 generated by the AGC control section 601, it has the circuit changing switch 607 changed so that it may choose any of the output signal of a low pass filter 605, and the output signal of D/A converter 116 they are. It is in the point which was made to control the gain control driver 106 before synchronous acquisition by the loop formation of an analog signal.

[0160] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 607 may choose a low pass filter 605 with the change signal 606 outputted from the AGC control section 601, and it constitutes the 2nd analog AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 108,109, the level wave detector 401, the error amplifier 604, a low pass filter 605, and a circuit changing switch 607.

[0161] This 2nd analog AGC loop formation operates as follows. To the reference signal (referred to as PREF2) from which the criteria data 602 outputted from the AGC control section 601 were changed into the analog signal with D/A converter 603, a 1st analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 401 may be set to -Aa(PIF-PREF2) =0. Aa is the gain in the error amplifier 604 here.

[0162] At this time, B-PREF2 which carried out the multiplication of the temperature coefficient B by the temperature data 503 to the criteria data 602 outputted from the AGC control section 601 is used as a convergence reference value. It controls by this to be set to -Aa(PIF-B-PREF2) =0.

[0163] Moreover, the AGC control section 601 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0164] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 2nd AGC loop formation to PR2 -- the AGC control section 115 -- the difference of - (PB-PR2) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of the loop gain A2 to this, and it controls to be set to -A2(PB-PR2) =0.

[0165] At this time, with the temperature data 503, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0166] Thus, since according to the receiving set 600 of the gestalt 6 of operation it is not necessary to mind processing with the AGC controller 601 and D/A converter 116 by controlling the gain control driver 106 before synchronous acquisition by the 2nd analog AGC loop formation except that the same effectiveness as the gestalt 5 of operation is acquired, loop control of automatic gain can be performed at high speed and simply.

[0167] (Gestalt 7 of operation) Drawing 7 shows the block diagram of the receiving set concerning the gestalt 7 of operation of this invention. However, in the gestalt 7 of operation shown in this drawing 7, the same sign is given to the part corresponding to each part of the gestalt 4 of operation of drawing 4, and that explanation is omitted.

[0168] In addition to the configuration of the receiving set 400 of the gestalt 4 of operation, the description of the receiving set 700 of the gestalt 7 of operation shown in drawing 7 connects the 2nd gain control driver 701 and the 3rd gain control driver 702 between the rectangular wave detector 107 and a low pass filter 108,109, and is that it controlled the gain of three gain control drivers 106,701,702 including them by the gain control data 120 outputted from the AGC control section 115.

[0169] In such a configuration, rectangular detection is carried out with the rectangular wave detector 107, low-pass wave filtration of I of an analog and the Q signal which are obtained by this is carried out with a low pass filter 108,109, they are changed into a digital signal with A/D converter 110,111, further, after correlation detection of the signal amplified with the gain control driver 106 is carried out with correlator 112,113, the synchronous detection of it is carried out in the synchronous-detection section 114, and it is outputted to the AGC control section 115.

[0170] The AGC control section 115 generates the gain control data 120 of a gain control driver 106,701,702 before reception synchronous acquisition based on the detection data 121 of the level wave detector 401 inputted through A/D converter 118.

[0171] The detection data 121 are set to PIF here. When the convergence reference value of the 4th AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116 is set to PR4, It equalizes about a value. the AGC control section 115 -- the difference of - (PIF-PR4) -- By carrying out the multiplication of loop gain A4 of the 4th AGC loop formation to this, the gain control data 120 are generated and it controls to be set to $-A4(PIF-PR4) = 0$ by this generated gain control data 120.

[0172] Next, the AGC control section 115 calculates received electric-field level from this square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0173] The received electric-field level data 122 are set to PB here. A gain control driver 106, the rectangular wave detector 107, When the convergence reference value of the 5th AGC loop formation which consists of a gain control driver 701,702, a low pass filter 108,109, A/D converter 110,111, correlator 112,113, the synchronous-detection section 114, the AGC control section 115, and D/A converter 116 is set to PR5, the AGC control section 115 -- the difference of - (PB-PR5) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A5 of the 5th AGC loop formation to this, and it controls to be set to $-A5(PB-PR5) = 0$.

[0174] According to the receiving set 700 of the gestalt 7 of operation, a gain control driver 701,702 is connected after the output of the rectangular wave detector 107. Thus, before reception synchronous acquisition By the 4th AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116, gain control drivers 106 and 701, Automatic gain control of 702 is performed. After reception synchronous acquisition A gain control driver 106, the rectangular wave detector 107, By the 5th AGC loop formation which consists of a gain control driver 701,702, a low pass filter 108,109, A/D converter 110,111, correlator 112,113, the synchronous-detection section 114, the AGC control section 115, and D/A converter 116, gain control drivers 106 and 701, It was made to perform automatic gain control of 702.

[0175] That is, the consumed electric current at the time of the automatic gain control of the gain control driver 106 in the input side of the rectangular wave detector 107 decreases by performing automatic gain control also with the gain control driver 701,702 of the output side of the rectangular wave detector 107, and since the consumed electric current is small and ends, the automatic gain control in the output side of the rectangular wave detector 107 can be further decreased rather than the configuration of the gestalt 4 of operation of the consumed electric current in the receiving set 700 whole.

[0176] (Gestalt 8 of operation) Drawing 8 shows the block diagram of the receiving set concerning the gestalt 8 of operation of this invention. However, in the gestalt 8 of operation shown in this drawing 8 , the same sign is given to the part corresponding to each part of the gestalt 7 of operation of drawing 7 , and that explanation is omitted.

[0177] In addition to the configuration of the receiving set 700 of the gestalt 7 of operation, the description of the receiving set 800 of the gestalt 8 of operation shown in drawing 8 is equipped with the temperature sensor 801 which measures the temperature of an equipment circuit, and A/D converter 802 which changes into a digital signal the temperature signal of the analog detected with the temperature sensor 801, and is that it amended the gain control data 120 of the AGC control section 804 according to the temperature data 803 outputted from A/D converter 802.

[0178] In such a configuration, the AGC control section 804 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition according to the detection data 121. the time of setting the detection data 121 to PIF here, and setting the convergence reference value of the 4th AGC loop formation to PR4 -- the AGC control section 115 -- the difference of - (PIF-PR4) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A4 to this, and it controls to be set to -A4(PIF-PR4) =0 by this generated gain control data 120.

[0179] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 4, and B-PR4 is used as a convergence reference value. It controls by this to be set to -A4(PIF-B-PR4) =0.

[0180] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0181] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 5th AGC loop formation to PR5 -- the AGC control section 115 -- the difference of - (PB-PR5) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A5 to this, and it controls to be set to -A5(PB-PR5) =0.

[0182] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 5, and B-PR5 is used as a convergence reference value. It controls by this to be set to -A5(PB-B-PR5) =0.

[0183] Thus, since according to the receiving set 800 of the gestalt 8 of operation the same effectiveness as the gestalt 7 of operation was acquired and also the temperature data 803 amended the gain control data 120 of the AGC control section 804, even when the circuit temperature of a receiving set 800 changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0184] (Gestalt 9 of operation) Drawing 9 shows the block diagram of the receiving set concerning the gestalt 9 of operation of this invention. However, in the gestalt 9 of operation shown in this drawing 9 , the same sign is given to the part corresponding to each part of the gestalt 8 of operation of drawing 8 , and that explanation is omitted.

[0185] The description of the receiving set 900 of the gestalt 9 of operation shown in drawing 9 D/A converter 903 which changes into an analog signal the criteria data 902 generated by the AGC control section 901 in addition to the configuration of the receiving set 800 of the gestalt 8 of operation, the output signal of the level wave detector 401 and D/A converter 903 -- difference -- with the error amplifier 904 to detect The low pass filter 905 which carries out low-pass wave filtration of the output signal of the error amplifier 904, According to the change signal 906 generated by the AGC control section 901, it has the circuit changing switch 907 changed so that it may choose any of the output signal of a low pass filter 905, and the output signal of D/A converter 116 they are. It is in the point which was made to control the gain control driver 106 before synchronous acquisition by the loop formation of an analog signal.

[0186] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 907 may choose a low pass filter 905 with the change signal 906 outputted from the AGC control section 901, and it constitutes the 3rd analog AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, the error amplifier 904, a low pass filter 905, and a circuit changing switch 907.

[0187] This 3rd analog AGC loop formation operates as follows. To the reference signal (referred to as PREF3) from which the criteria data 902 outputted from the AGC control section 901 were changed into the analog signal with D/A converter 903, a 3rd analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 401 may be set to -Aa(PIF-PREF3) =0. Aa is the gain in the error amplifier 904 here.

[0188] At this time, B-PREF3 which carried out the multiplication of the temperature coefficient B by the temperature data 803 to the criteria data 902 outputted from the AGC control section 901 is used as a convergence reference value. It controls by this to be set to -Aa(PIF-B-PREF3) =0.

[0189] Moreover, the AGC control section 901 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0190] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 5th AGC loop formation to PR5 -- the AGC control section 115 -- the difference of - (PB-PR5) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A5 to this, and it controls to be set to -A5(PB-PR5) =0.

[0191] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR5 is used as a convergence reference value. It controls by this to be set to -A5(PB-B-PR5) =0.

[0192] Thus, since according to the receiving set 900 of the gestalt 9 of operation it is not necessary to mind processing with the AGC controller 901 and D/A converter 116 by controlling the gain control driver 106,701,702 before synchronous acquisition by the 3rd analog AGC loop formation except that the same effectiveness as the gestalt 8 of operation is acquired, loop control of automatic gain can be performed at high speed and simply.

[0193] (Gestalt 10 of operation) Drawing 10 shows the block diagram of the receiving set concerning the gestalt 10 of operation of this invention. However, in the gestalt 10 of operation shown in this drawing 10 , the same sign is given to the part corresponding to each part of the gestalt 1 of operation of drawing 1 , and that explanation is omitted.

[0194] In addition to the configuration of the receiving set 100 of the gestalt 1 of operation, the description of the receiving set 1000 of the gestalt 10 of operation shown in drawing 10 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0195] In such a configuration, the AGC control section 115 generates the gain control data 120 of a gain control driver 106 according to the detection data 121 before reception synchronous acquisition. When the detection data 121 are set to PIF here and the convergence reference value of the 1st AGC loop formation is set to PR1, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A1 to this. the difference of PIF-PR1 -- D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 115, and it controls so that the gain control data 120 are set to -A1(PIF-PR1) =0.

[0196] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0197] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - the difference of PB-PR2 -- equalizing about a value, generating the gain control data 120 by carrying out the multiplication of the loop gain A2 to this, and with the symbol clock 1001 extracted from the synchronous-detection section 114 D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 115, and it controls so that the gain control data 120 are set to -A2(PB-PR2) =0.

[0198] thus , since the gain of the RF section within 1 symbol time amount become fixed since the control voltage of an AGC loop formation be controlled by N twice (N be an integer) of the symbol clock 1001 extracted from the synchronous detection section 114 after reception synchronous acquisition according to the receiving set 1000 of the gestalt 10 of operation , and there be no degradation of the correlation property by gain fluctuation within 1 symbol time amount , a good correlation property can be acquire .

[0199] (Gestalt 11 of operation) Drawing 11 shows the block diagram of the receiving set concerning the gestalt 11 of operation of this invention. However, in the gestalt 11 of operation shown in this drawing 11 , the same sign is given to the part corresponding to each part of the gestalt 2 of operation of drawing 2 , and that explanation is omitted.

[0200] In addition to the configuration of the receiving set 200 of the gestalt 2 of operation, the description of the receiving set 1100 of the gestalt 11 of operation shown in drawing 11 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 204, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0201] In such a configuration, the AGC control section 204 generates the gain control data 120 of a gain control driver 106 according to the detection data 121 before reception synchronous acquisition. When the detection data 121 are set to PIF here and the convergence reference value of the 1st AGC loop formation is set to PR1, the AGC control section 204 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A1 to this. the difference of PIF-PR1 -- D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 204, and it controls so that the gain control data 120 are set to -A1(PIF-PR1) =0.

[0202] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR1 is used as a convergence reference value. It controls by this to be set to -A1(PIF-B-PR1) =0.

[0203] Next, as for the AGC control section 204, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0204] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A2 to this. the difference of PB-PR2 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 115. It controls so that the gain control data 120 are set to -A2(PB-PR2) =0.

[0205] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0206] Thus, since the control voltage of an AGC loop formation was controlled by N times (N is an integer) of the symbol clock 1001 extracted from the synchronous-detection section 114 after reception synchronous acquisition according to the receiving set 1100 of the gestalt 11 of operation, the gain of the RF section within 1 symbol time amount becomes fixed. Since there is no degradation of the correlation property by gain fluctuation within 1 symbol time amount, a good correlation property is acquired. Since the temperature data 203 amended the gain control data 120 of the AGC control section 204, even when circuit temperature changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0207] (Gestalt 12 of operation) Drawing 12 shows the block diagram of the receiving set concerning the gestalt 12 of operation of this invention. However, in the gestalt 12 of operation shown in this drawing 12 , the same sign is given to the part corresponding to each part of the gestalt 3 of operation of drawing 3 , and that explanation is omitted.

[0208] In addition to the configuration of the receiving set 300 of the gestalt 3 of operation, the description of the receiving set 1200 of the gestalt 12 of operation shown in drawing 12 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0209] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 307 may choose a low pass filter 305 with the change signal 306 outputted from the AGC control section 301, and it constitutes the 1st analog AGC loop formation which consists of a gain control driver 106, the level wave detector 117, the error amplifier 304, a low pass filter 305, and a circuit changing switch 307.

[0210] This 1st analog AGC loop formation operates as follows. To the reference signal (referred to as PREF) from which the criteria data 302 outputted from the AGC control section 301 were changed into the analog signal with D/A converter 303, a 1st analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 117 may be set to -Aa(PIF-PREF) =0. Aa is the gain in the error amplifier 304 here.

[0211] At this time, B-PREF which carried out the multiplication of the temperature coefficient B by the temperature data 203 to the criteria data 302 outputted from the AGC control section 301 is used as a convergence reference value. It controls by this to be set to -Aa(PIF-B-PREF) =0.

[0212] Moreover, the AGC control section 301 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0213] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A2 to this. the difference of PB-PR2 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 115. It controls so that the gain control data 120 are set to -A2(PB-PR2) =0.

[0214] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0215] thus , since according to the receiving set 1200 of the gestalt 12 of operation the gain of the RF section within 1 symbol time amount become fixed since the control voltage of an AGC loop formation be controlled by N twice (N be an integer) of the symbol clock 1001 extracted from the synchronous detection section 114 after reception synchronous acquisition , and there be no degradation of the correlation property by gain fluctuation within 1 symbol time amount , a good correlation property can be acquire .

[0216] Moreover, since it is not necessary to mind processing with the AGC controller 301 and D/A converter 116 by controlling the gain control driver 106 before synchronous acquisition by the 1st analog AGC loop formation, loop control of automatic gain can be performed at high speed and simply.

[0217] (Gestalt 13 of operation) Drawing 13 shows the block diagram of the receiving set concerning the gestalt 13 of operation of this invention. However, in the gestalt 13 of operation shown in this drawing 13 , the same sign is given to the part corresponding to each part of the gestalt 4 of operation of drawing 4 , and that explanation is omitted.

[0218] In addition to the configuration of the receiving set 400 of the gestalt 4 of operation, the description of the receiving set 1300 of the gestalt 13 of operation shown in drawing 13 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1603 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0219] In such a configuration, the AGC control section 115 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition based on the detection data 121 of the level wave detector 401 inputted through A/D converter 118.

[0220] When the detection data 121 are set to PIF here and the convergence reference value of the 3rd AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116 is set to PR3, It equalizes about a value. the AGC control section 115 -- the difference of - (PIF-PR3) -- The gain control data 120 are generated by carrying out the multiplication of loop gain A3 to this. D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 115, and it controls to be set to -A3(PIF-PR3) =0 by the gain control data 120.

[0221] Next, the AGC control section 115 calculates received electric-field level from this square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this. When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A2 to this. the difference of PB-PR2 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 115. It controls so that the gain control data 120 are set to -A2(PB-PR2) =0.

[0222] thus , since according to the receiving set 1300 of the gestalt 13 of operation the gain of the RF section within 1 symbol time amount become fixed since the control voltage of an AGC loop formation be controlled by N twice (N be an integer) of the symbol clock 1001 extracted from the synchronous detection section 114 after reception synchronous acquisition , and there be no degradation of the correlation property by gain fluctuation within 1 symbol time amount , a good correlation property can be acquire .

[0223] Moreover, since the level of I which constitutes the 3rd AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116, and is output from the rectangular wave detector 107 before reception synchronous acquisition, and a Q signal was made to perform AGC control, it may come to compare with IF frequency detection in case a signal-to-noise ratio is the gestalt 1 of operation, and AGC control can carry out with a sufficient precision also at the time of low reception input electric field.

[0224] (Gestalt 14 of operation) Drawing 14 shows the block diagram of the receiving set concerning the gestalt 14 of operation of this invention. However, in the gestalt 14 of operation shown in this drawing 14 , the same sign is given to the part corresponding to each part of the gestalt 5 of operation of drawing 5 , and that explanation is omitted.

[0225] In addition to the configuration of the receiving set 500 of the gestalt 5 of operation, the description of the receiving set 1400 of the gestalt 14 of operation shown in drawing 14 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1301 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0226] In such a configuration, the AGC control section 504 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition according to the detection data 121. When the detection data 121 are set to PIF here and the convergence reference value of the 3rd AGC loop formation is set to PR3, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of loop gain A3 to this. the difference of PIF-PR3 -- D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 504, and it controls to be set to -A3(PIF-PR3) =0 by the gain control data 120.

[0227] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 3, and B-PR3 is used as a convergence reference value. It controls by this to be set to -A3(PIF-B-PR3) =0.

[0228] Next, as for the AGC control section 115, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data

122 are outputted by this.

[0229] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A2 to this. the difference of PB-PR2 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 115. It controls so that the gain control data 120 are set to -A2(PB-PR2) =0.

[0230] At this time, with the temperature data 203, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.

[0231] Thus, according to the receiving set 1400 of the gestalt 14 of operation, can acquire the same effectiveness as the gestalt 5 of operation, and also Since the control voltage of an AGC loop formation was controlled by N times (N is an integer) of the symbol clock 1001 extracted from the synchronous-detection section 114 after reception synchronous acquisition, the gain of the RF section within 1 symbol time amount becomes fixed. Since a good correlation property is acquired since there is no degradation of the correlation property by gain fluctuation within 1 symbol time amount, and the temperature data 503 amended the gain control data 120 of the AGC control section 504 Even when the circuit temperature of a receiving set 1400 changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0232] (Gestalt 15 of operation) Drawing 15 shows the block diagram of the receiving set concerning the gestalt 15 of operation of this invention. However, in the gestalt 15 of operation shown in this drawing 15 , the same sign is given to the part corresponding to each part of the gestalt 6 of operation of drawing 6 , and that explanation is omitted.

[0233] In addition to the configuration of the receiving set 600 of the gestalt 6 of operation, the description of the receiving set 1500 of the gestalt 15 of operation shown in drawing 15 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0234] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 607 may choose a low pass filter 605 with the change signal 606 outputted from the AGC control section 601, and it constitutes the 2nd analog AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a low pass filter 108,109, the level wave detector 401, the error amplifier 604, a low pass filter 605, and a circuit changing switch 607.

[0235] This 2nd analog AGC loop formation operates as follows. To the reference signal (referred to as PREF2) from which the criteria data 602 outputted from the AGC control section 601 were changed into the analog signal with D/A converter 603, a 1st analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 401 may be set to -Aa(PIF-PREF2) =0. Aa is the gain in the error amplifier 604 here.

[0236] At this time, B-PREF2 which carried out the multiplication of the temperature coefficient B by the temperature data 503 to the criteria data 602 outputted from the AGC control section 601 is used as a convergence reference value. It controls to be set to -Aa(PIF-B and PREF2) =0 from the control signal 1002 of the AGC control section 601 by this with the control clock 1501 generated by the timing control section 1003.

[0237] Moreover, the AGC control section 601 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0238] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 2nd AGC loop formation is set to PR2, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of the loop gain A2 to

this. the difference of PB-PR2 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock 1502 as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 601. It controls so that the gain control data 120 are set to -A2(PB-PR2) =0.
[0239] At this time, with the temperature data 503, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR2 is used as a convergence reference value. It controls by this to be set to -A2(PB-B-PR2) =0.
[0240] Thus, according to the receiving set 1500 of the gestalt 15 of operation, can acquire the same effectiveness as the gestalt 6 of operation, and also Since the control voltage of an AGC loop formation was controlled by N times (N is an integer) of the symbol clock 1001 extracted from the synchronous-detection section 114 after reception synchronous acquisition, the gain of the RF section within 1 symbol time amount becomes fixed. Since there is no degradation of the correlation property by gain fluctuation within 1 symbol time amount, a good correlation property can be acquired.
[0241] Moreover, since it is not necessary to mind processing with the AGC controller 601 and D/A converter 116 by controlling the gain control driver 106 before synchronous acquisition by the 2nd analog AGC loop formation, loop control of automatic gain can be performed at high speed and simply.
[0242] (Gestalt 16 of operation) Drawing 16 shows the block diagram of the receiving set concerning the gestalt 16 of operation of this invention. However, in the gestalt 16 of operation shown in this drawing 16 , the same sign is given to the part corresponding to each part of the gestalt 7 of operation of drawing 7 , and that explanation is omitted.
[0243] In addition to the configuration of the receiving set 700 of the gestalt 7 of operation, the description of the receiving set 1600 of the gestalt 16 of operation shown in drawing 16 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1301 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.
[0244] Rectangular detection is carried out with the rectangular wave detector 107, adjustable gain magnification is carried out with the 2nd gain control driver 701,702, low-pass wave filtration of I of an analog and the Q signal which are obtained by this is carried out with a low pass filter 108,109, and the signal amplified with the gain control driver 106 in such a configuration is changed into a digital signal with A/D converter 110,111, and further, after correlation detection is carried out with correlator 112,113, the synchronous detection of it is carried out in the synchronous-detection section 114, and it is outputted to the AGC control section 115.
[0245] The AGC control section 115 generates the gain control data 120 of a gain control driver 106,701,702 before reception synchronous acquisition based on the detection data 121 of the level wave detector 401 inputted through A/D converter 118.
[0246] The detection data 121 are set to PIF here. When the convergence reference value of the 4th AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116 is set to PR4, It equalizes about a value. the AGC control section 115 -- the difference of - (PIF-PR4) -- The gain control data 120 are generated by carrying out the multiplication of loop gain A4 of the 4th AGC loop formation to this. D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 504, and it controls to be set to -A4(PIF-PR4) =0 by the gain control data 120.
[0247] Next, after reception synchronous acquisition calculates received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.
[0248] The received electric-field level data 122 are set to PB here. A gain control driver 106, the rectangular wave detector 107, When the convergence reference value of the 5th AGC loop formation which consists of a gain control driver 701,702, a low pass filter 108,109, A/D converter 110,111,

correlator 112,113, the synchronous-detection section 114, the AGC control section 115, and D/A converter 116 is set to PR5, It equalizes about a value. the AGC control section 115 -- the difference of -(PB-PR5) -- The gain control data 120 are generated by carrying out the multiplication of loop gain A5 of the 5th AGC loop formation to this. D/A converter 116 is controlled by the N times (N is an integer) as many control clock as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 601. - Control to be set to A5(PB-PR5) =0.

[0249] thus , since according to the receiving set 1600 of the gestalt 16 of operation the gain of the RF section within 1 symbol time amount become fixed since the control voltage of an AGC loop formation be controlled by N twice (N be an integer) of the symbol clock 1001 extracted from the synchronous detection section 114 after reception synchronous acquisition , and there be no degradation of the correlation property by gain fluctuation within 1 symbol time amount , a good correlation property can be acquire .

[0250] A gain control driver 701,702 is connected after the output of the rectangular wave detector 107. Moreover, before reception synchronous acquisition By the 4th AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, A/D converter 118, the AGC control section 115, and D/A converter 116, gain control drivers 106 and 701, Automatic gain control of 702 is performed. After reception synchronous acquisition A gain control driver 106, the rectangular wave detector 107, By the 5th AGC loop formation which consists of a gain control driver 701,702, a low pass filter 108,109, A/D converter 110,111, correlator 112,113, the synchronous-detection section 114, the AGC control section 115, and D/A converter 116, gain control drivers 106 and 701, Since it was made to perform automatic gain control of 702, by performing automatic gain control also with the gain control driver 701,702 of the output side of the rectangular wave detector 107 The consumed electric current at the time of the automatic gain control of the gain control driver 106 in the input side of the rectangular wave detector 107 decreases. Moreover, since the consumed electric current is small and ends, the automatic gain control in the output side of the rectangular wave detector 107 can be further decreased rather than the configuration of the gestalt 14 of operation of the consumed electric current in the receiving set 1600 whole.

[0251] (Gestalt 17 of operation) Drawing 17 shows the block diagram of the receiving set concerning the gestalt 17 of operation of this invention. However, in the gestalt 17 of operation shown in this drawing 17 , the same sign is given to the part corresponding to each part of the gestalt 8 of operation of drawing 8 , and that explanation is omitted.

[0252] In addition to the configuration of the receiving set 800 of the gestalt 8 of operation, the description of the receiving set 1700 of the gestalt 17 of operation shown in drawing 17 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0253] In such a configuration, the AGC control section 804 generates the gain control data 120 of a gain control driver 106 before reception synchronous acquisition according to the detection data 121. When the detection data 121 are set to PIF here and the convergence reference value of the 4th AGC loop formation is set to PR4, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of loop gain A4 to this. the difference of PIF-PR4 -- D/A converter 116 is controlled by the control clock generated by the timing control section 1003 from the control signal 1002 of the AGC control section 804, and it controls to be set to -A4(PIF-PR4) =0 by the gain control data 120.

[0254] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 4, and B-PR4 is used as a convergence reference value. It controls by this to be set to -A4(PIF-B-PR4) =0.

[0255] Next, as for the AGC control section 804, after reception synchronous acquisition, i.e., reception synchronous detection, calculate received electric-field level from this square root of I2+Q2 using the output I and Q signal of the synchronous-detection section 114. The received electric-field level data 122 are outputted by this.

[0256] the time of setting the received electric-field level data 122 to PB here, and setting the convergence reference value of the 5th AGC loop formation to PR5 -- the AGC control section 115 -- the difference of - (PB-PR5) -- it equalizes about a value, and the gain control data 120 are generated by carrying out the multiplication of loop gain A5 to this, and it controls to be set to -A5(PB-PR5) =0.

[0257] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR 5, and B-PR5 is used as a convergence reference value. It controls by this to be set to -A5(PB-B-PR5) =0.

[0258] Thus, according to the receiving set 1700 of the gestalt 17 of operation, can acquire the same effectiveness as the gestalt 8 of operation, and also Since the control voltage of an AGC loop formation was controlled by N times (N is an integer) of the symbol clock 1001 extracted from the synchronous-detection section 114 after reception synchronous acquisition, the gain of the RF section within 1 symbol time amount becomes fixed. Since a good correlation property is acquired since there is no degradation of the correlation property by gain fluctuation within 1 symbol time amount, and the temperature data 803 amended the gain control data 120 of the AGC control section 804 Even when the circuit temperature of a receiving set 1700 changes, a temperature anomaly is amended, and the precision of automatic gain control can be compensated.

[0259] (Gestalt 18 of operation) Drawing 18 shows the block diagram of the receiving set concerning the gestalt 18 of operation of this invention. However, in the gestalt 18 of operation shown in this drawing 18 , the same sign is given to the part corresponding to each part of the gestalt 9 of operation of drawing 9 , and that explanation is omitted.

[0260] In addition to the configuration of the receiving set 900 of the gestalt 9 of operation, the description of the receiving set 1800 of the gestalt 18 of operation shown in drawing 18 is equipped with the symbol clock 1001 extracted from the synchronous-detection section 114, and the timing control section 1003 which generates the control timing signal of D/A converter 116 from the control signal 1002 of the AGC control section 115, and is that it controlled the AGC loop formation synchronizing with the symbol clock extracted in the synchronous-detection section 114.

[0261] In such a configuration, before reception synchronous acquisition, it changes so that a circuit changing switch 907 may choose a low pass filter 905 with the change signal 906 outputted from the AGC control section 901, and it constitutes the 3rd analog AGC loop formation which consists of a gain control driver 106, the rectangular wave detector 107, a gain control driver 701,702, a low pass filter 108,109, the level wave detector 401, the error amplifier 904, a low pass filter 905, and a circuit changing switch 907.

[0262] This 3rd analog AGC loop formation operates as follows. To the reference signal (referred to as PREF3) from which the criteria data 902 outputted from the AGC control 901 were changed into the analog signal with D/A converter 903, a 3rd analog AGC loop formation operates so that the output signal (referred to as PIF) of the level wave detector 401 may be set to -Aa(PIF-PREF3) =0. Aa is the gain in the error amplifier 904 here.

[0263] At this time, B-PREF3 which carried out the multiplication of the temperature coefficient B by the temperature data 803 to the criteria data 902 outputted from the AGC control section 901 is used as a convergence reference value. It controls by this to be set to -Aa(PIF-B and PREF3) =0 from the control signal 1002 of the AGC control section 901 with the control clock 1501 generated by the timing control section 1003.

[0264] Moreover, the AGC control section 901 calculates the received electric-field level data 122 from the square root of I2+Q2 after reception synchronous acquisition using the output I and Q signal of the synchronous-detection section 114.

[0265] When the received electric-field level data 122 are set to PB here and the convergence reference value of the 5th AGC loop formation is set to PR5, the AGC control section 115 - Equalize about a value and generate the gain control data 120 by carrying out the multiplication of loop gain A5 to this.

the difference of PB-PR5 -- D/A converter 116 is controlled by the N times (N is an integer) as many control clock 1502 as the symbol clock generated by the timing control section 1003 from the control signal 1002 of the symbol clock 1001 extracted from the synchronous-detection section 114, and the AGC control section 601. - Control to be set to A5(PB-PR5) =0.

[0266] At this time, with the temperature data 803, the multiplication of the temperature coefficient B is carried out to the convergence reference value PR, and B-PR5 is used as a convergence reference value. It controls by this to be set to -A5(PB-B-PR5) =0.

[0267] Thus, according to the receiving set 1800 of the gestalt 18 of operation, can acquire the same effectiveness as the gestalt 9 of operation, and also Since the control voltage of an AGC loop formation was controlled by N times (N is an integer) of the symbol clock 1001 extracted from the synchronous-detection section 114 after reception synchronous acquisition, the gain of the RF section within 1 symbol time amount becomes fixed. By acquiring a good correlation property and controlling the gain control driver 106,701,702 before synchronous acquisition by the 3rd analog AGC loop formation, since there is no degradation of the correlation property by gain fluctuation within 1 symbol time amount Since it is not necessary to mind processing with the AGC controller 901 and D/A converter 116, loop control of automatic gain can be performed at high speed and simply.

[0268]

[Effect of the Invention] As explained above, according to this invention, receiving gain control and received electric-field level detection can be performed by the low consumed electric current.

[0269] In the condition that there is no correlation output signal before reception synchronous acquisition, by performing gain control of a gain control magnification means using the detection data of an intermediate frequency band, the saturation of the input signal to the A/D-conversion means before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.

[0270] Even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.

[0271] Since it is not necessary to mind processing of the automatic gain control which used the detection data of an intermediate frequency band by performing automatic gain control before synchronous acquisition by the analog AGC loop formation, automatic gain control can be performed at high speed and simply.

[Translation done.]

* NOTICES *

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the receiving set and the receiving approach which applied the CDMA (Code Division Multiple Access) method used for digital mobile communications etc.

[Translation done.]

* NOTICES *

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PRIOR ART

[Description of the Prior Art] By the CDMA method, in the sending set of a base station, the signal modulated the 1st order is modulated the 2nd order with a diffusion signal, it transmits, and what correlation with the diffusion signal of the channel of choice is taken for (the back diffusion of electrons is carried out) extracts the target primary modulated wave in the receiving set of a mobile station.
[0003] In process of this back diffusion of electrons, the signal of other channels other than the channel of choice serves as a noise. Since the signal wave from a base station to a mobile station which it gets down and is made into the purpose by the circuit, and the other interference wave reach each mobile station in response to fluctuation similarly on a propagation path, the relation of the receiving level of the signal wave after the back diffusion of electrons in each mobile station and an interference wave becomes fixed.
[0004] however, by the going-up circuit from a mobile station to a base station, even if it transmits a signal wave with transmitted power with each same mobile station, the distance and the propagation environment from a mobile station to a base station differ from each other, respectively -- it comes out and the receiving level in the base station of each signal wave is different.
[0005] For this reason, in a base station, in order to restore to each signal wave correctly by the back diffusion of electrons, the receiving level of each signal wave must be arranged and transmitted power control of high degree of accuracy and an extensive dynamic range is needed for a mobile station. Moreover, in order to perform power control to each mobile station in a base station with high precision, it is necessary to measure the received electric-field level of a local station with high precision, and to report to a base station with a mobile station.
[0006] Drawing 19 shows the block diagram of the conventional receiving set. However, let this receiving set be a base station in digital mobile communication system, or the thing used a migration office.
[0007] The conventional receiving set 1900 shown in drawing 19 An antenna 1901 and the 1st band pass filter 1902, A low noise amplifier 1903, the down mixer 1904, and the 2nd band pass filter 1905, A gain control driver 1906, the rectangular wave detector 1907, and the 1st and 2nd low pass filters 1908 and 1909, It has 1st and 2nd A/D converters 1910 and 1911, the 1st and 2nd correlators 1912 and 1913, the synchronous-detection section 1914, the AGC (Automatic Gain Control) control section 1915, and D/A converter 1916, and is constituted.
[0008] In such a configuration, wave filtration only of the band necessary with a band pass filter 1902 is carried out, and low noise magnification of the quadrature amplitude modulation signal received with the antenna 1901 is carried out with a low noise amplifier 1903. Frequency conversion of this amplified signal is carried out to IF frequency (intermediate frequency) with the down mixer 1904, and it is amplified with a gain control driver 1906.
[0009] This gain control driver 1906 is generated by the AGC control section 1915, and that gain is controlled according to the gain control signal supplied through D/A converter 1916. Control of this gain is performed so that the output level of A/D converters 1910 and 1911 may become fixed.
[0010] Thus, rectangular detection of the signal by which gain was amplified with the gain control

driver 1906 by which adjustable control is carried out is carried out with the rectangular wave detector 1907, and I channel signaling (the following, I signal) and Q channel signaling (the following, Q signal) are acquired by this.

[0011] Low-pass wave filtration of I of an analog and the Q signal is carried out with low pass filters 1908 and 1909, and it is changed into a digital signal with A/D converters 1910 and 1911, and further, after correlation detection is carried out with correlators 1912 and 1913, a synchronous detection is carried out in the synchronous-detection section 1914, and I signal 1917 and Q signal 1918 are outputted by this.

[0012] Moreover, digital I and the Q signal which are outputted from A/D converters 1910 and 1911 are inputted into the AGC control section 1915, and they generate the received electric-field level data 1919 here while they generate the gain control data for controlling the gain of a gain control driver 1906 to D/A converter 1916 so that they I and the receiving level of a Q signal may become fixed.

[0013]

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to this invention, receiving gain control and received electric-field level detection can be performed by the low consumed electric current.
[0269] In the condition that there is no correlation output signal before reception synchronous acquisition, by performing gain control of a gain control magnification means using the detection data of an intermediate frequency band, the saturation of the input signal to the A/D-conversion means before synchronous acquisition can be prevented, and a good receiving property can be acquired by this.
[0270] Even when the temperature of a receiving set changes, the precision of automatic gain control can be compensated.
[0271] Since it is not necessary to mind processing of the automatic gain control which used the detection data of an intermediate frequency band by performing automatic gain control before synchronous acquisition by the analog AGC loop formation, automatic gain control can be performed at high speed and simply.

[Translation done.]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in conventional equipment, in order to calculate the receiving level detection for performing receiving gain control and received electric-field level detection by the AGC control section 1915 of the high-speed chip rate constituted by the digital circuit and to perform it from digital I outputted from A/D converters 1910 and 1911, and Q signal level, there is a problem that the consumed electric current by the high-speed operation becomes large.
[0014] This invention is made in view of this point, and it aims at offering the receiving set and the receiving approach of performing receiving gain control and received electric-field level detection by the low consumed electric current.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the receiving set concerning the gestalt 1 of operation of this invention
[Drawing 2] The block diagram of the receiving set concerning the gestalt 2 of operation of this invention
[Drawing 3] The block diagram of the receiving set concerning the gestalt 3 of operation of this invention
[Drawing 4] The block diagram of the receiving set concerning the gestalt 4 of operation of this invention
[Drawing 5] The block diagram of the receiving set concerning the gestalt 5 of operation of this invention
[Drawing 6] The block diagram of the receiving set concerning the gestalt 6 of operation of this invention
[Drawing 7] The block diagram of the receiving set concerning the gestalt 7 of operation of this invention
[Drawing 8] The block diagram of the receiving set concerning the gestalt 8 of operation of this invention
[Drawing 9] The block diagram of the receiving set concerning the gestalt 9 of operation of this invention
[Drawing 10] The block diagram of the receiving set concerning the gestalt 10 of operation of this invention
[Drawing 11] The block diagram of the receiving set concerning the gestalt 11 of operation of this invention
[Drawing 12] The block diagram of the receiving set concerning the gestalt 12 of operation of this invention
[Drawing 13] The block diagram of the receiving set concerning the gestalt 13 of operation of this invention
[Drawing 14] The block diagram of the receiving set concerning the gestalt 14 of operation of this invention
[Drawing 15] The block diagram of the receiving set concerning the gestalt 15 of operation of this invention
[Drawing 16] The block diagram of the receiving set concerning the gestalt 16 of operation of this invention
[Drawing 17] The block diagram of the receiving set concerning the gestalt 17 of operation of this invention
[Drawing 18] The block diagram of the receiving set concerning the gestalt 18 of operation of this invention
[Drawing 19] The block diagram of the conventional receiving set

[Description of Notations]
106 Gain Control Driver
107 Rectangular Wave Detector
110,111,118 A/D converter
116 D/A Converter
112,113 Correlator
114 Synchronous-Detection Section
115, 204, 301, 504,601,804,901 AGC control section
117,401 Level wave detector
120 Gain Control Data
121 Detection Data
122 Received Electric-Field Level Data
302,602,902 Criteria data
304,604,904 Error amplifier
306,606,906 Change signal
307,607,907 Circuit changing switch
1001 Symbol Clock
1002 Control Signal
1003 Timing Control Section

[Translation done.]

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

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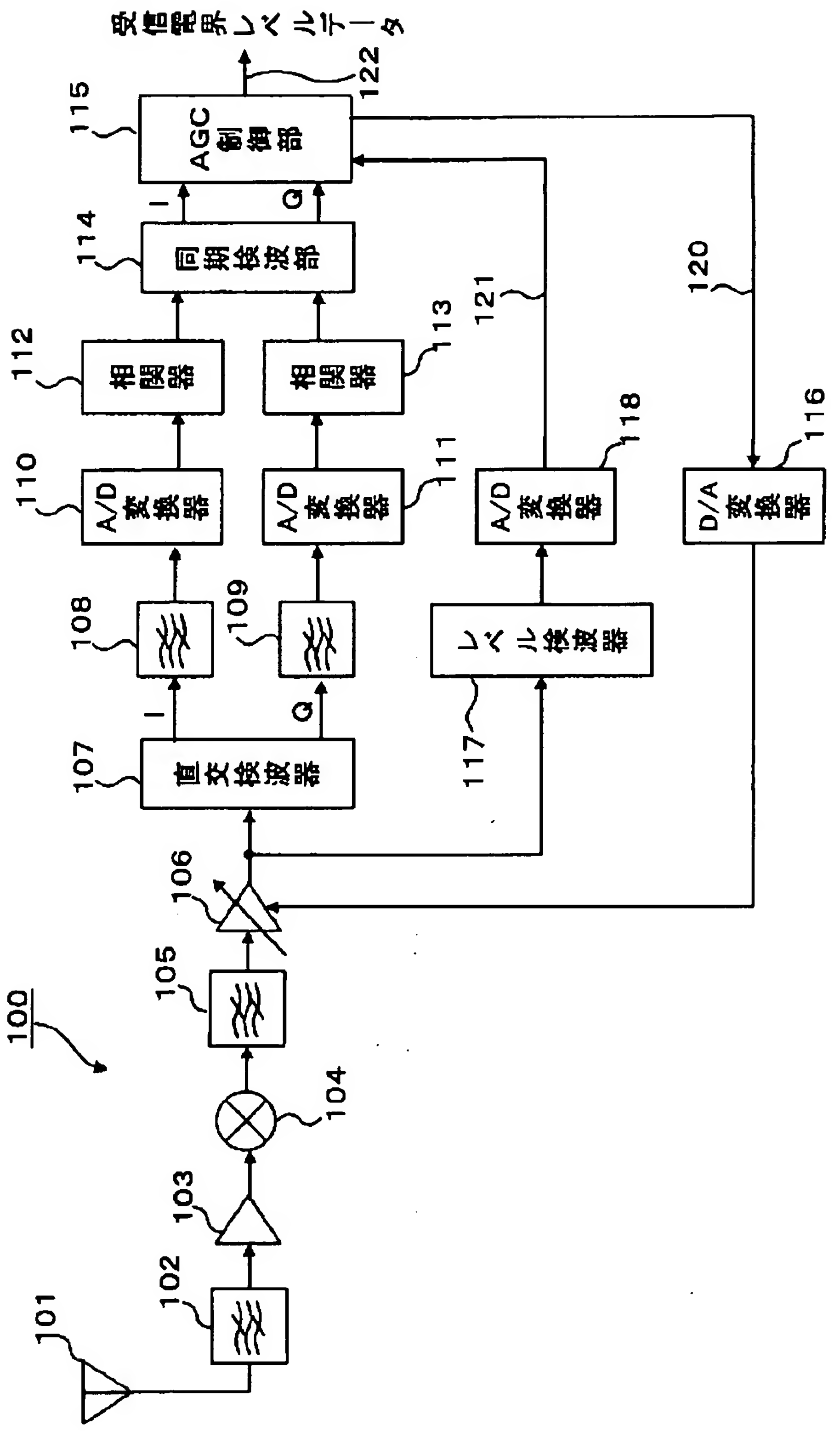
受信電界レベルデータ
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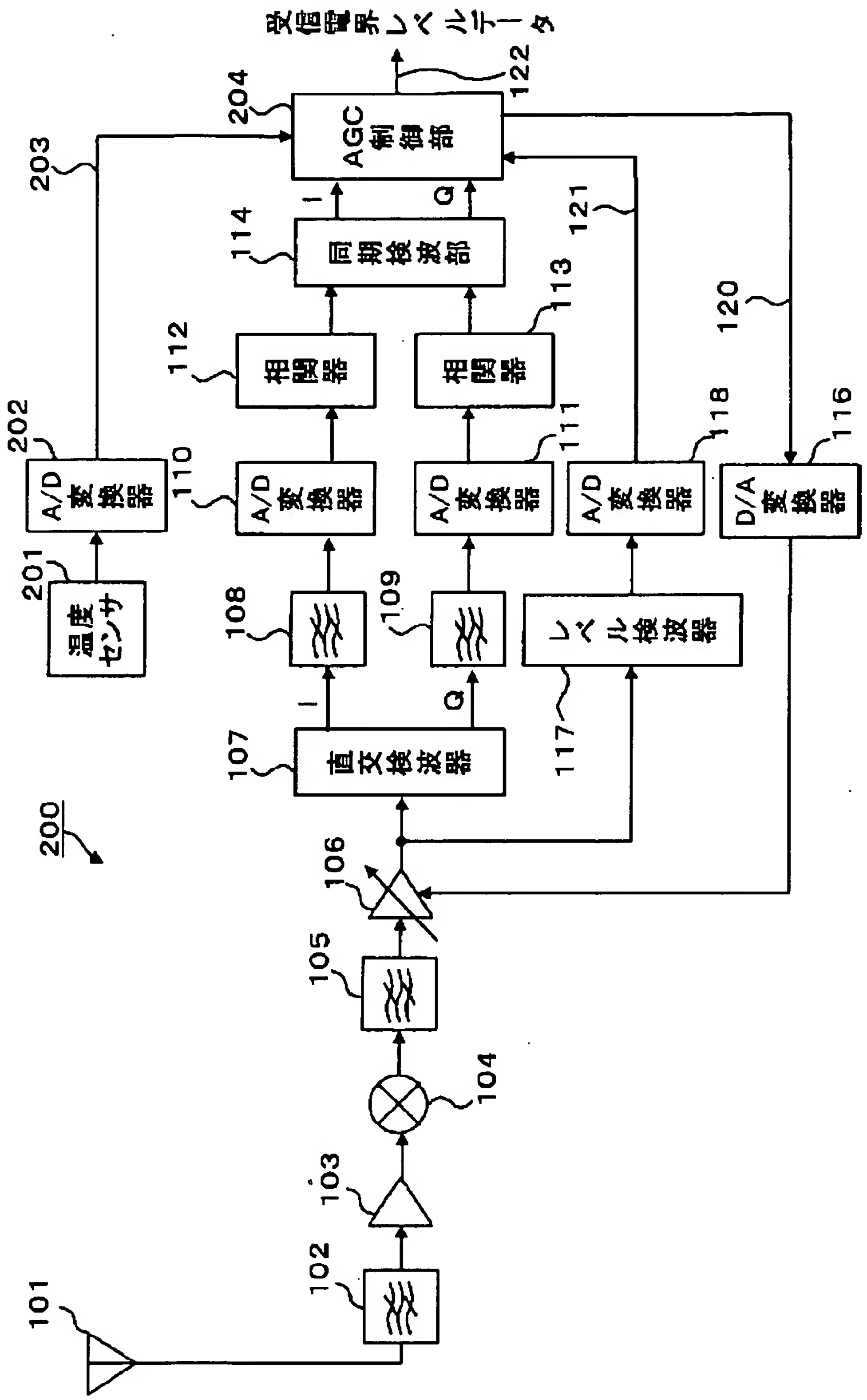
115
AGC制御部
I
Q
114
同期検波部
112
相関器
113
相関器
121
120
110
A/D変換器
111
A/D変換器
118
A/D変換器
116
D/A変換器
108
109
レベル検波器
117
I
Q
107
直交検波器
106
105
100
104
103
102
101

[Drawing 2]

h c g cg b eb cg e e


受信電界レベルデータ
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204
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I
Q
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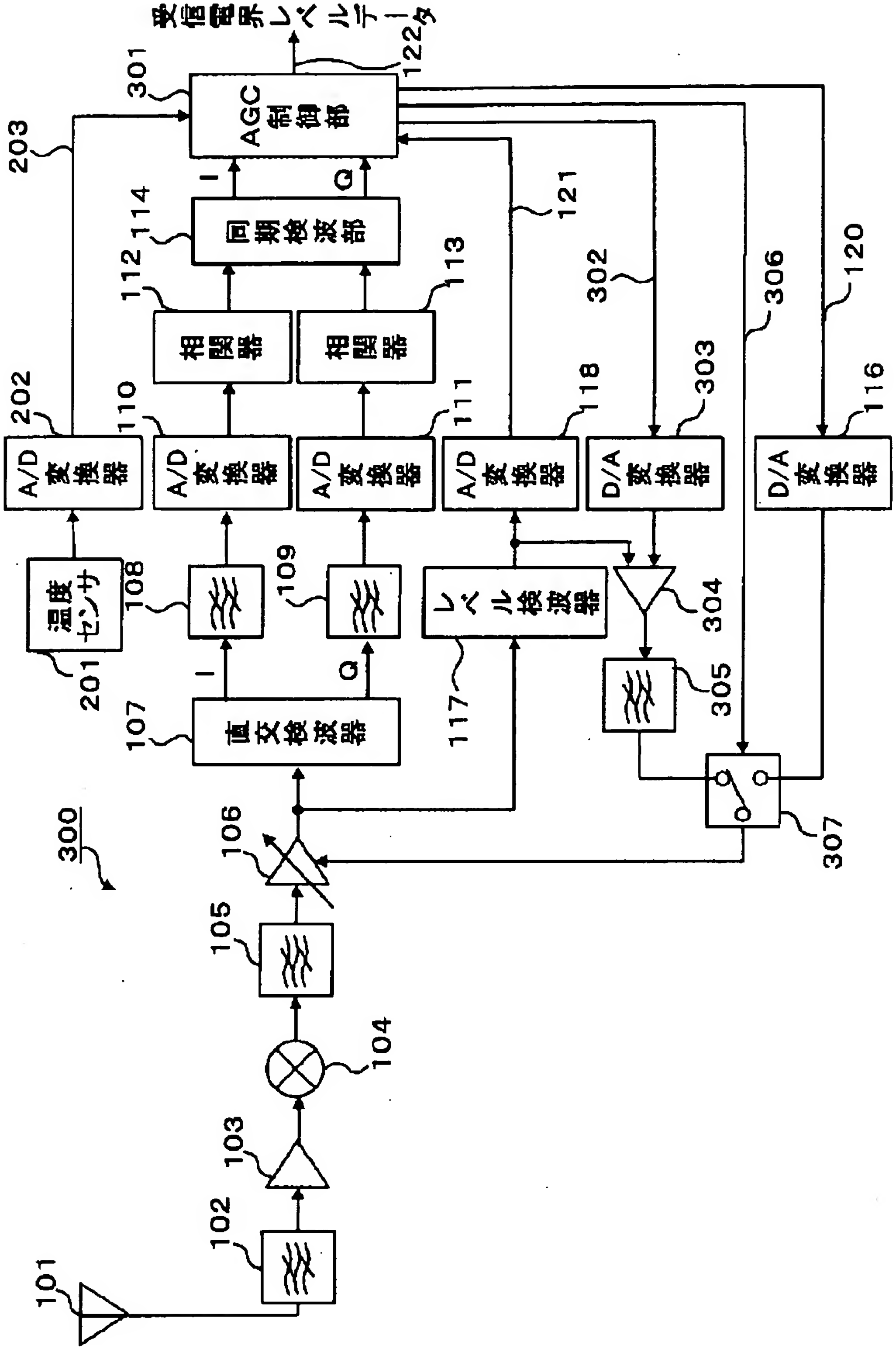
同期検波部
113
112
相関器
相関器
120
202
A/D変換器
110
A/D変換器
A/D変換器
111
A/D変換器
118
D/A変換器
116
201
温度センサ
108
109
レベル検波器
117
I
Q
107
直交検波器
200
106
105
104
103
102
101

[Drawing 3]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相関器
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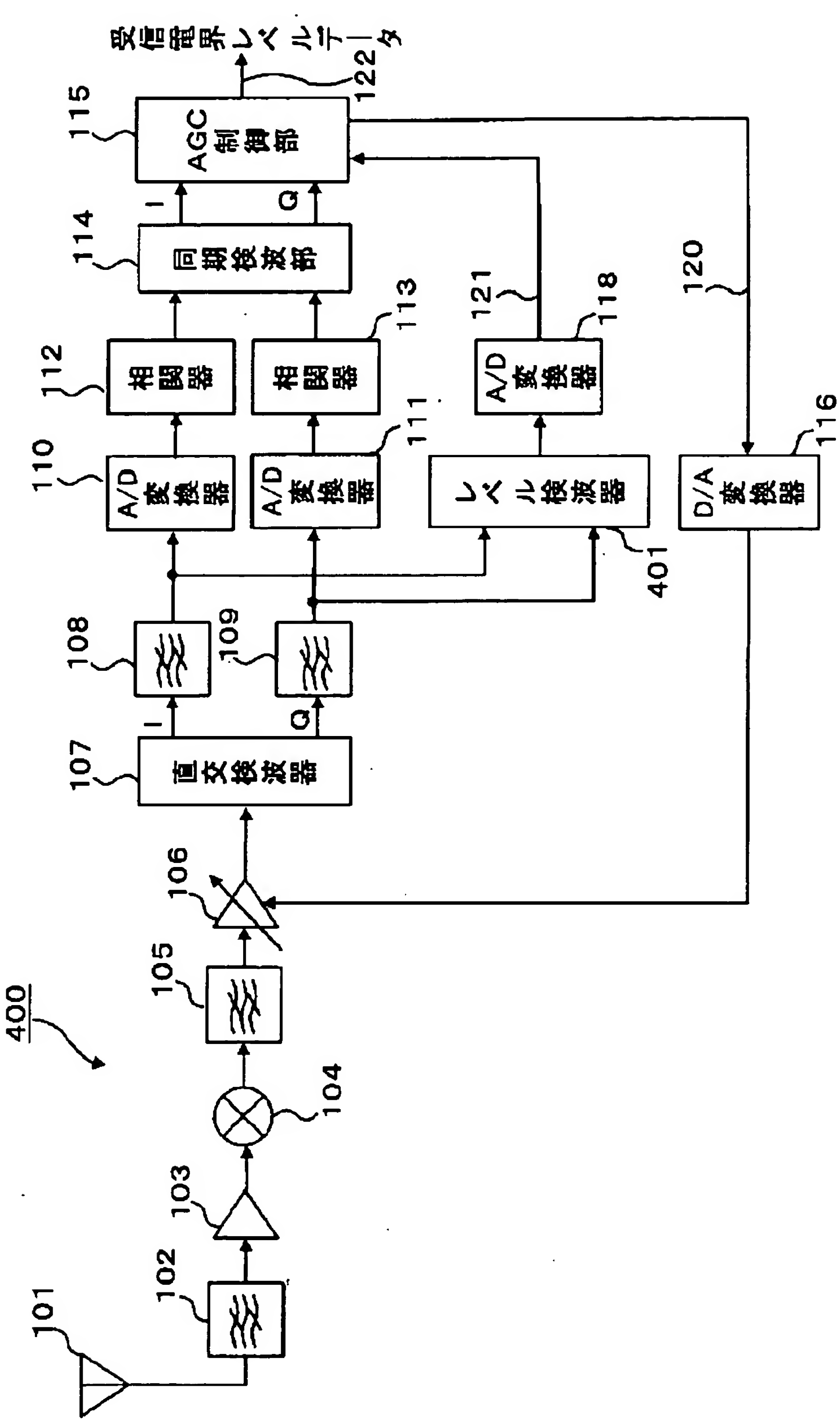
A/D変換器
A/D変換器
A/D変換器
D/A変換器
D/A変換器
温度センサ
レベル検波器
I
Q
直交検波器

[Drawing 4]

[Drawing 5]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101
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106
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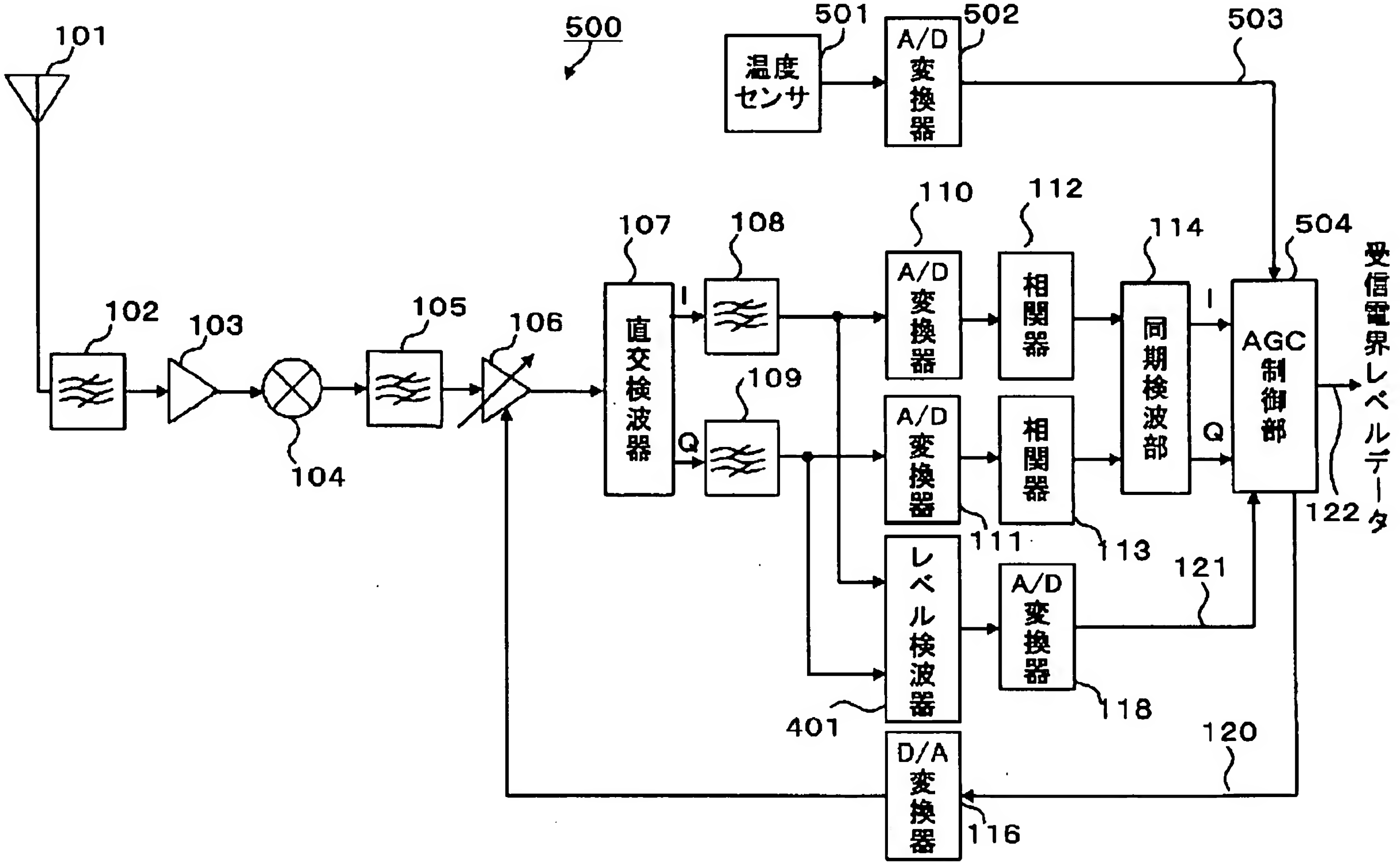
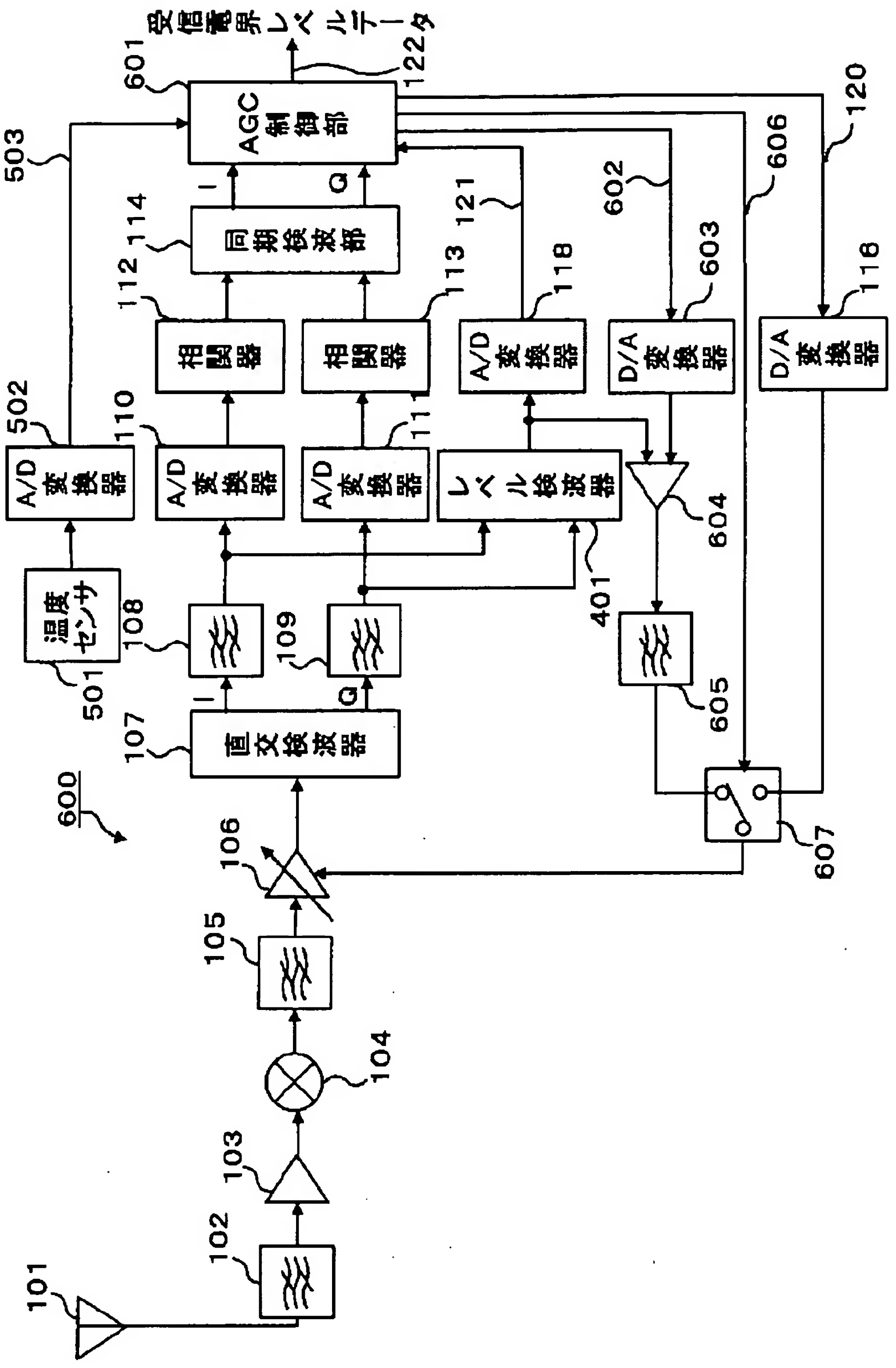
直交検波器
I
Q
108
109
110
A/D変換器
111
A/D変換器
112
相関器
113
相関器
114
同期検波部
115
AGC制御部
I
Q
116
D/A変換器
118
A/D変換器
120
121
122
401
レベル検波器
受信電界レベルデータ

h c g cg b eb cg e e

[Drawing 6]

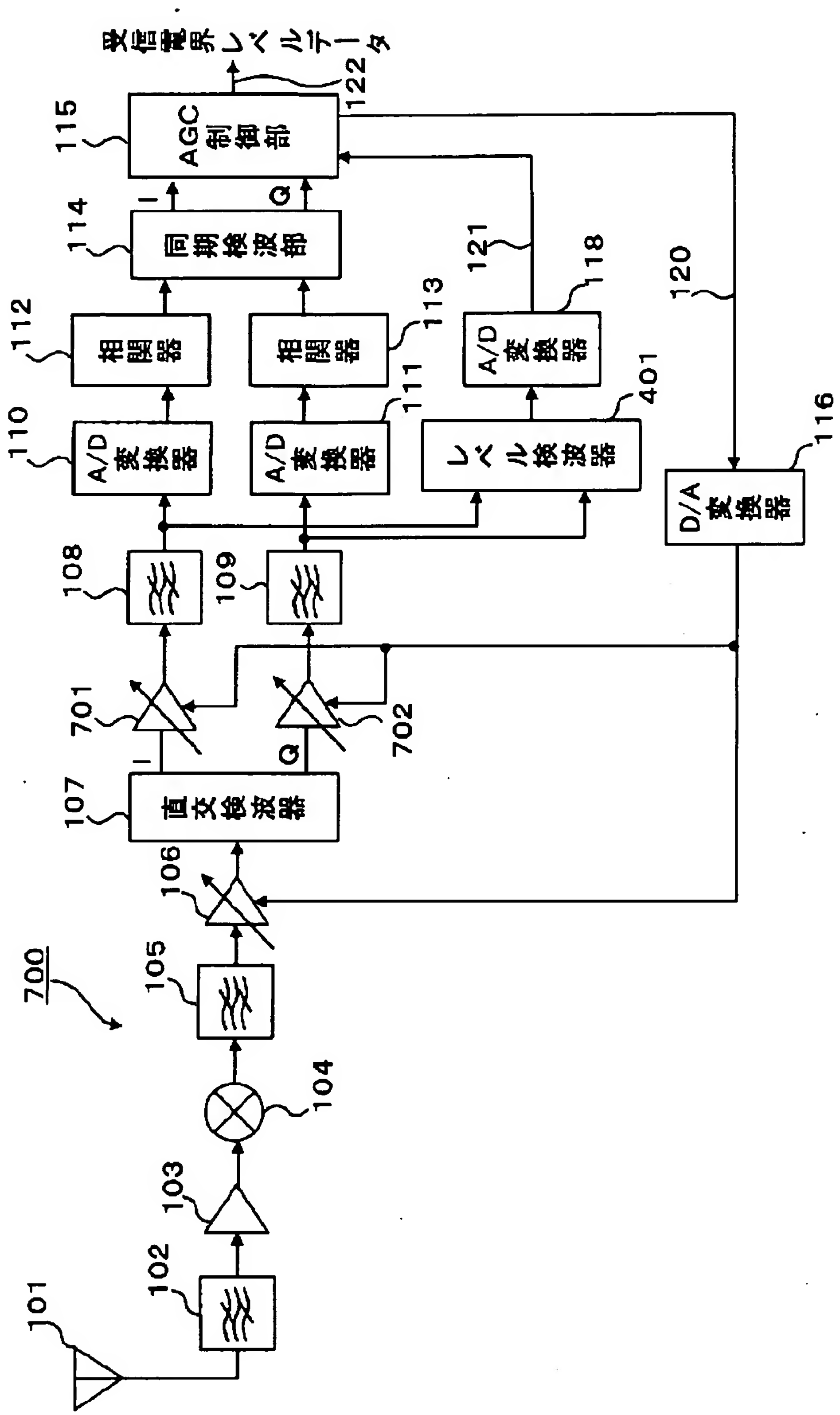

500
101
102
103
104
105
106
107
直交検波器
I
Q
108
109
110
A/D 変換器
111
A/D 変換器
112
相関器
113
相関器
114
同期検波部
I
Q
401
レベル検波器
118
A/D 変換器
121
116
D/A 変換器
120
501
温度センサ
502
A/D 変換器
503
504
AGC 制御部
122
受信電界レベルデータ

h c g cg b eb cg e e


受信電界レベルデータ
122
601
AGC制御部
120
606
602
503
I
Q
121
114
同期検波部
603
112
113
118
116
相関器
相関器
A/D変換器
D/A変換器
D/A変換器
502
110
111
A/D変換器
A/D変換器
A/D変換器
レベル検波器
604
温度センサ
401
108
109
605
501
I
Q
107
直交検波器
600
106
607
105
104
103
102
101

[Drawing 7]

h c g cg b eb cg e e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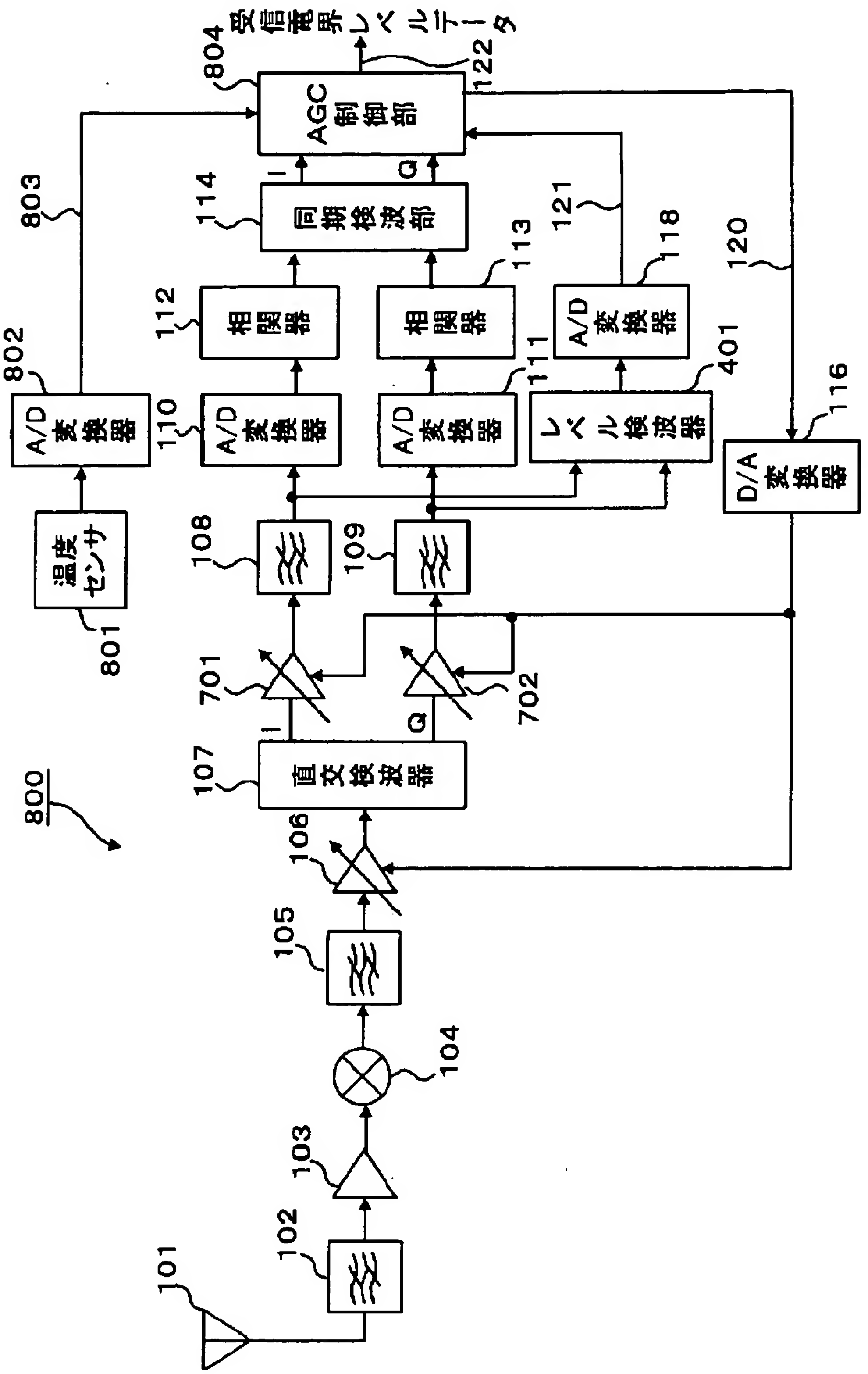
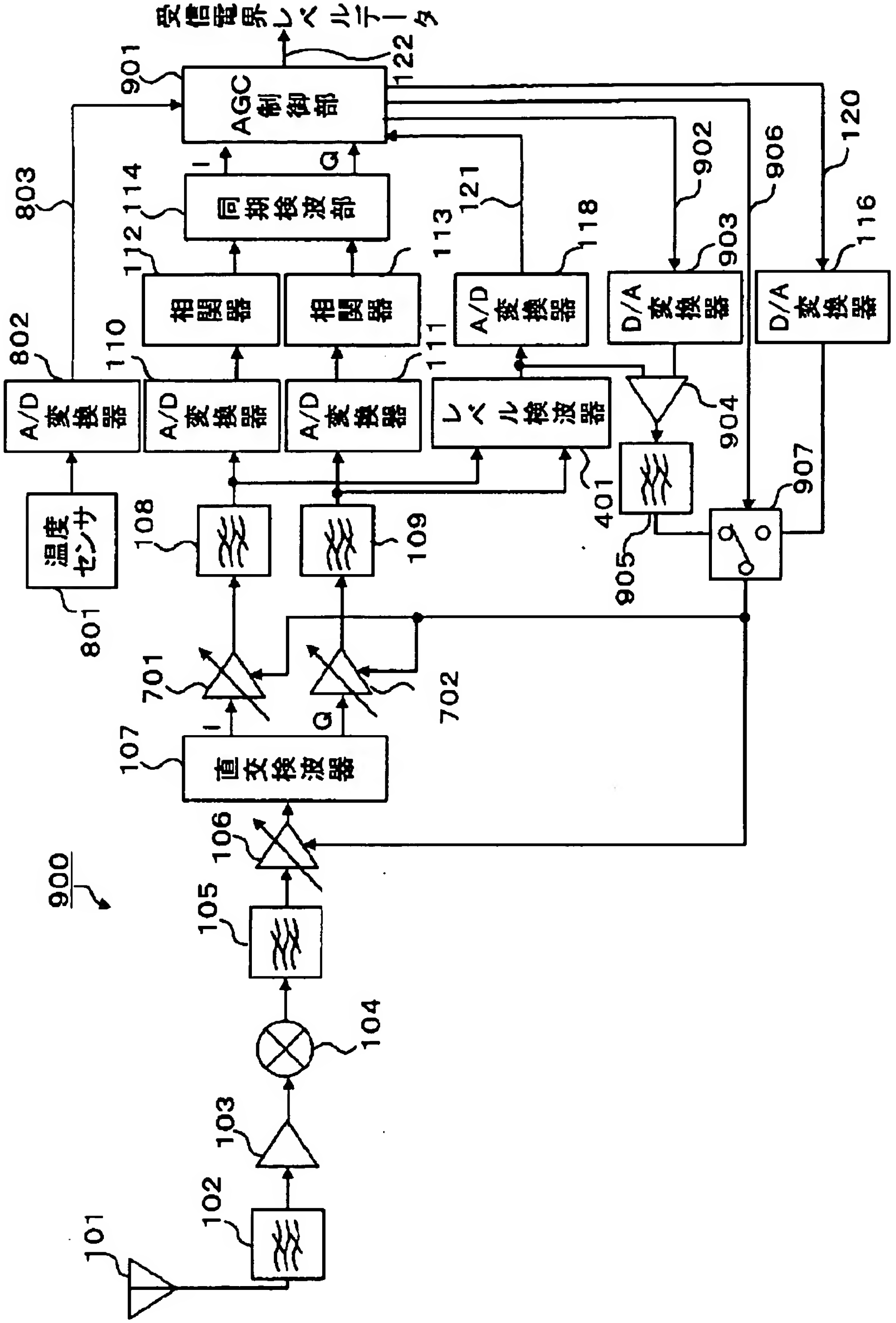
同期検波部
I
Q
相関器
相関器
A/D変換器
A/D変換器
A/D変換器
レベル検波器
D/A変換器
I
Q
直交検波器

[Drawing 8]


直交検波器
I
Q
A/D変換器
A/D変換器
レベル検波器
相関器
相関器
A/D変換器
同期検波部
I
Q
AGC制御部
受信電界レベルデータ
D/A変換器
温度センサ
A/D変換器

[Drawing 9]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Q
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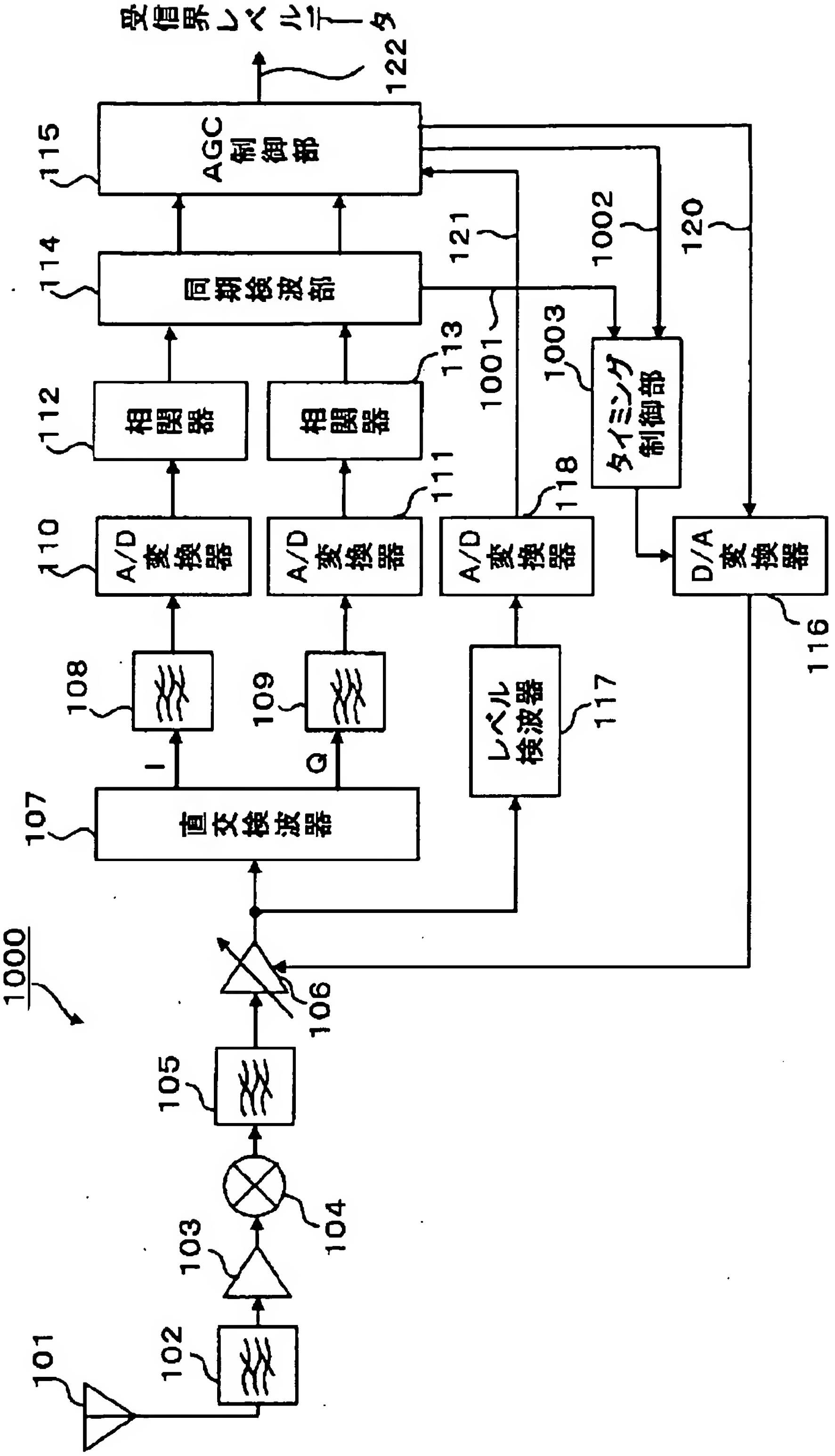
A/D変換器
A/D変換器
A/D変換器
相関器
相関器
A/D変換器
D/A変換器
D/A変換器
レベル検波器
温度センサ
I
Q
直交検波器

[Drawing 10]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I
Q
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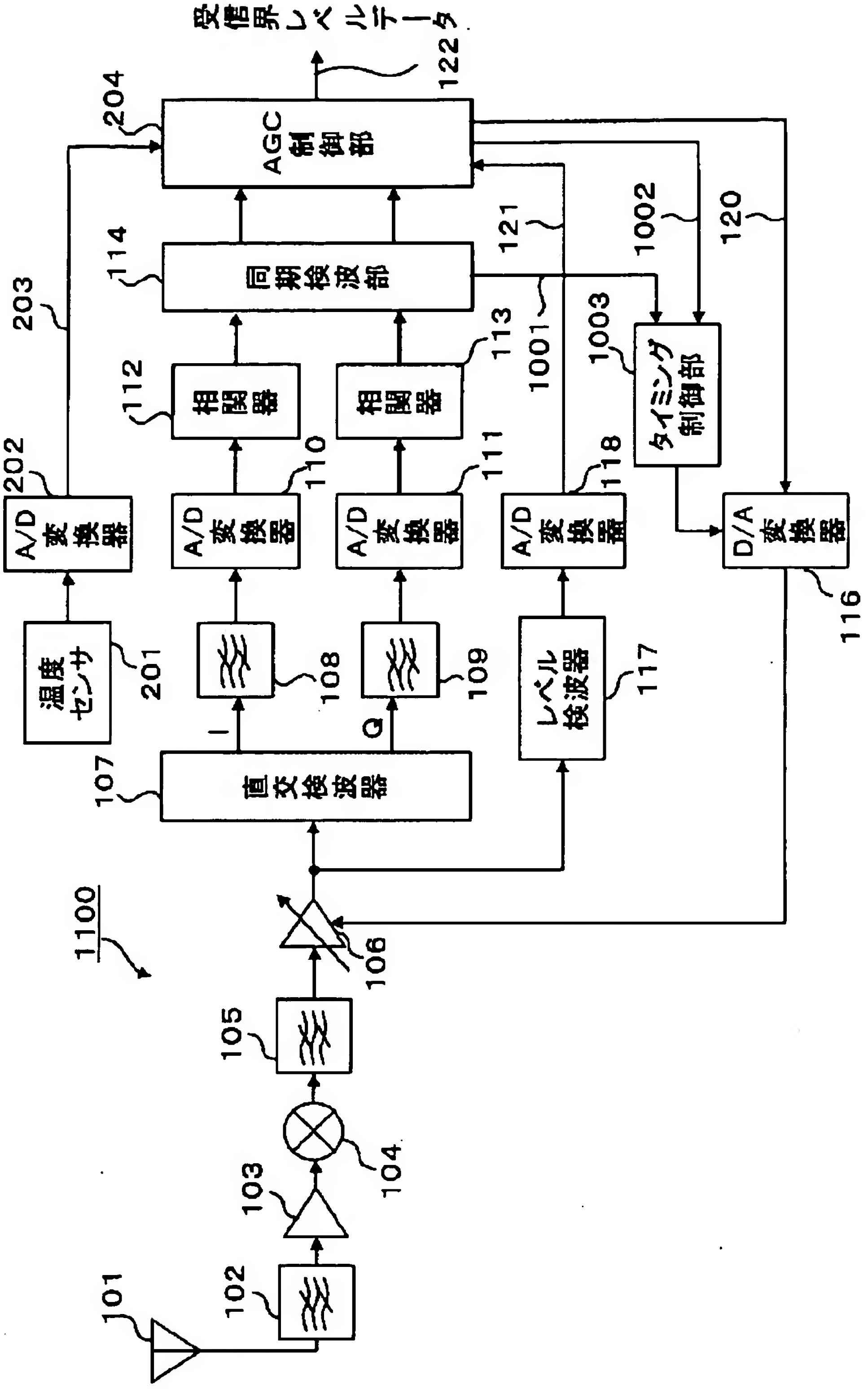
A/D変換器
相関器
相関器
同期検波部
AGC制御部
D/A変換器
レベル検波器
A/D変換器
受信界レベルデータ
タイミング制御部

[Drawing 11]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タイミング制御部
A/D変換器
A/D変換器
A/D変換器
D/A変換器
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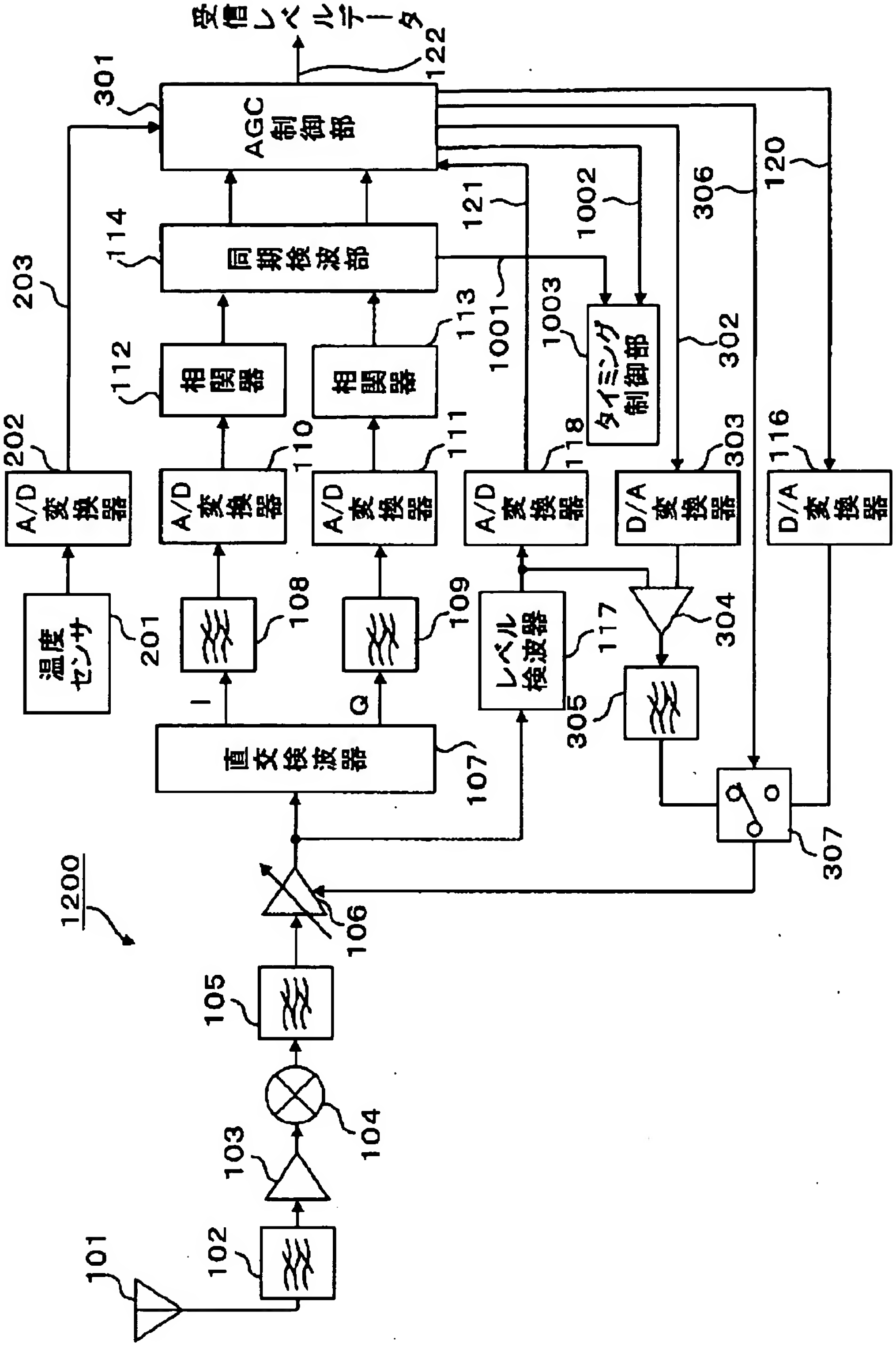
レベル検波器
I
Q
直交検波器

[Drawing 12]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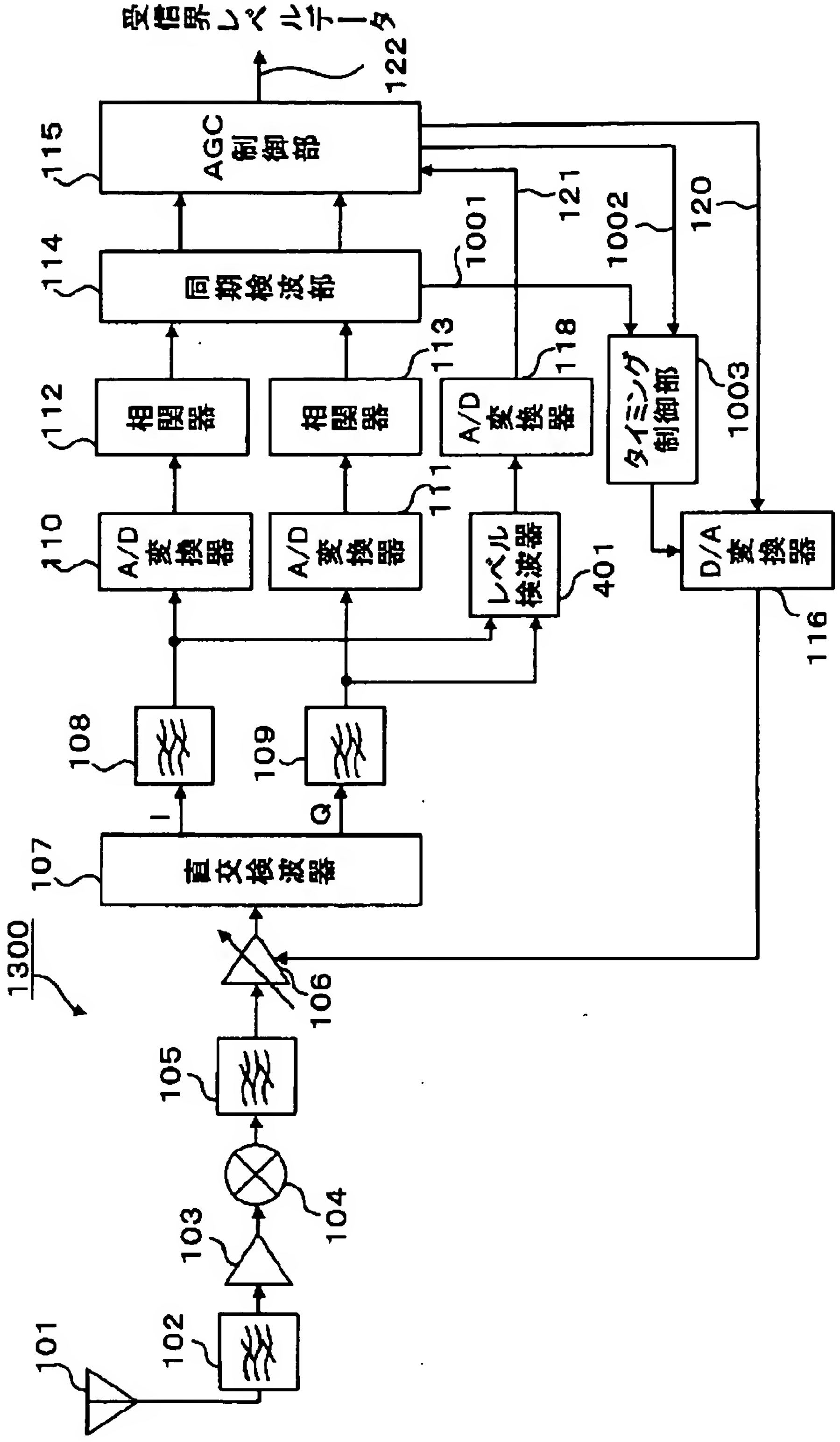
A/D変換器
A/D変換器
A/D変換器
D/A変換器
D/A変換器
温度センサ
レベル検波器
I
Q
直交検波器

[Drawing 13]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相関器
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相関器
113
A/D
変換器
118
タイミング
制御部
1003
A/D
変換器
110
A/D
変換器
111
レベル
検波器
401
D/A
変換器
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108
109
I
Q
直交検波器
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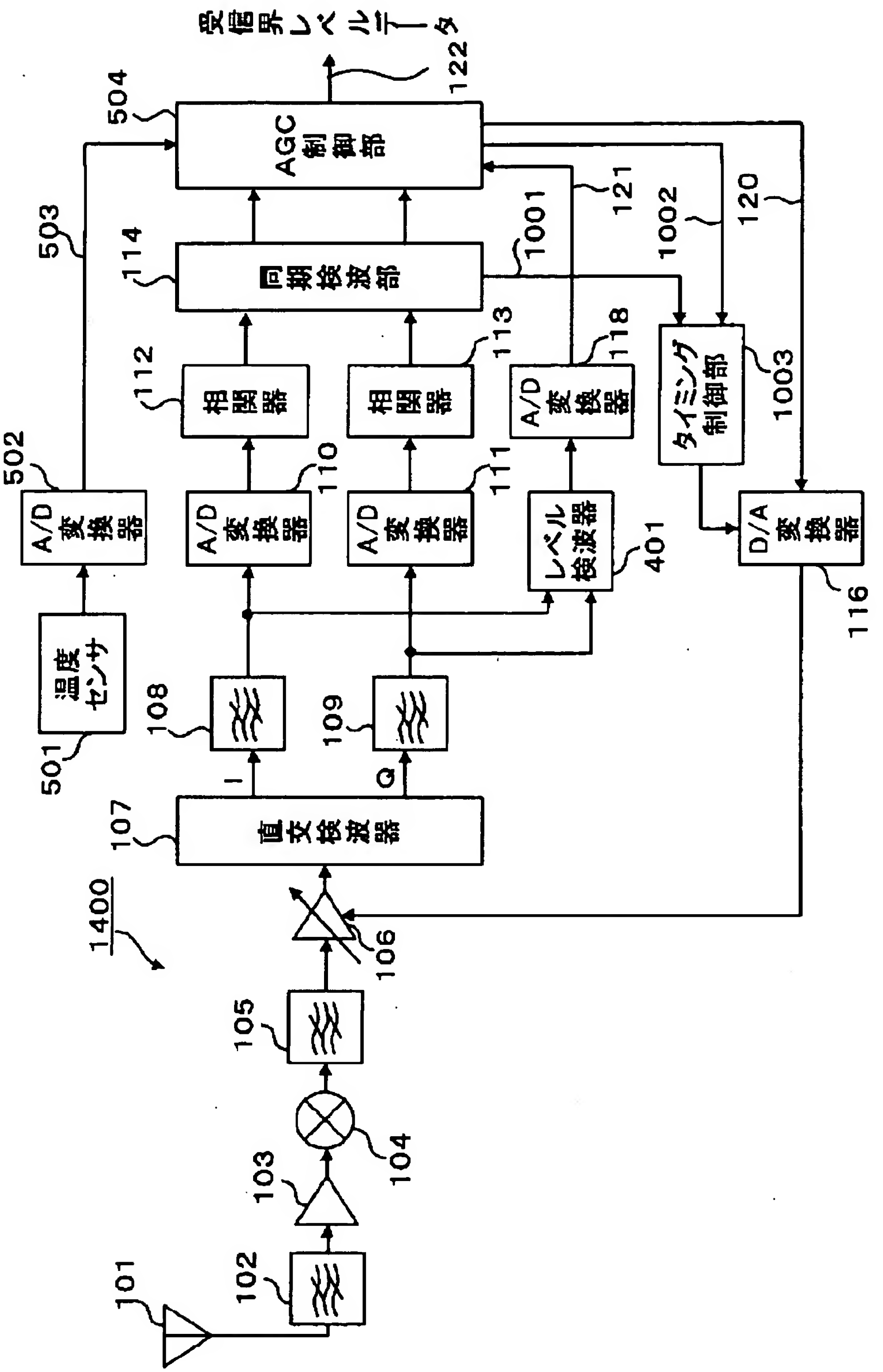
105
104
103
102
101

[Drawing 14]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相関器
A/D変換器
タイミング制御部
A/D変換器
A/D変換器
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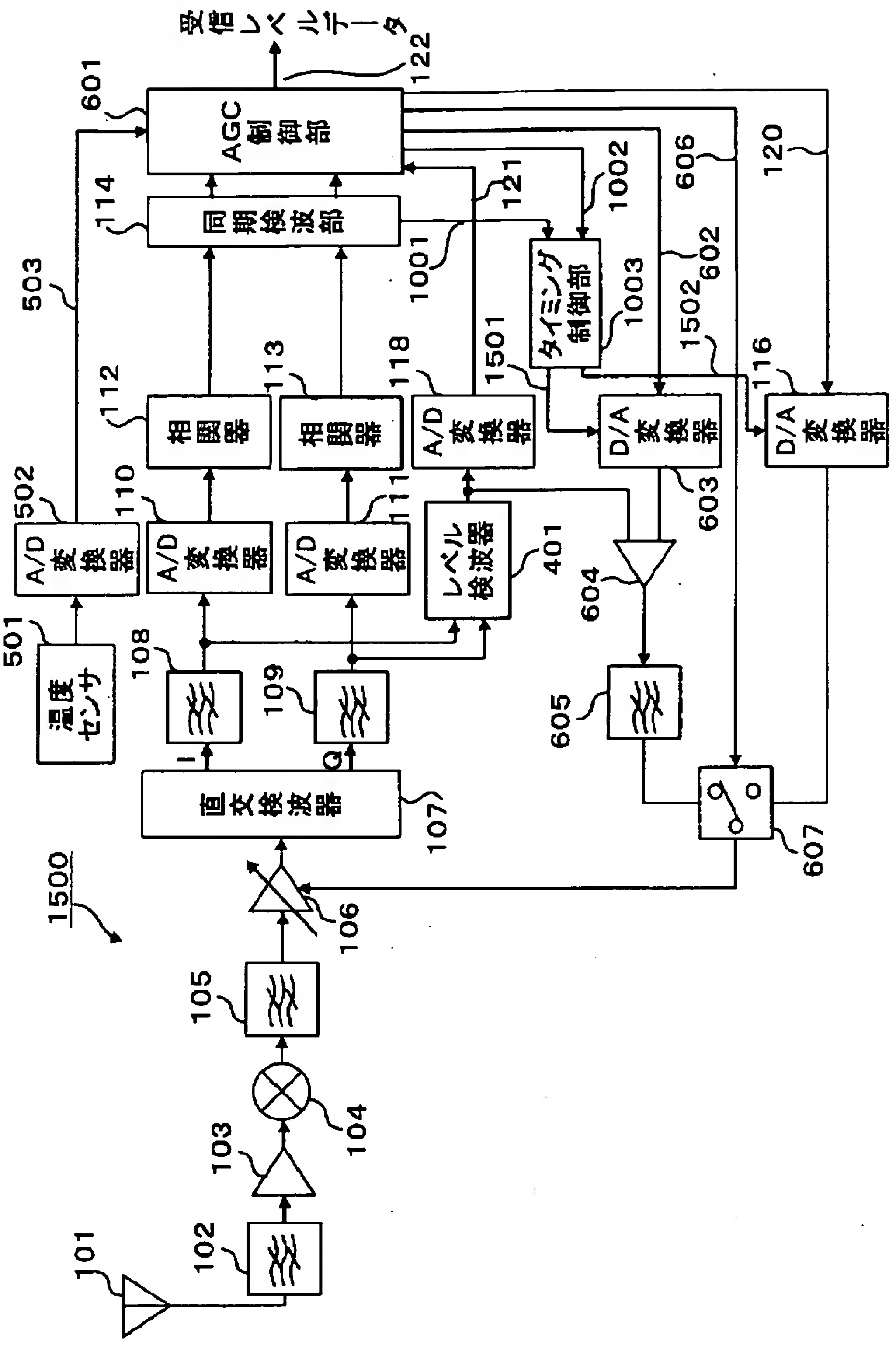
D/A変換器
温度センサ
I
Q
直交検波器

[Drawing 15]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113
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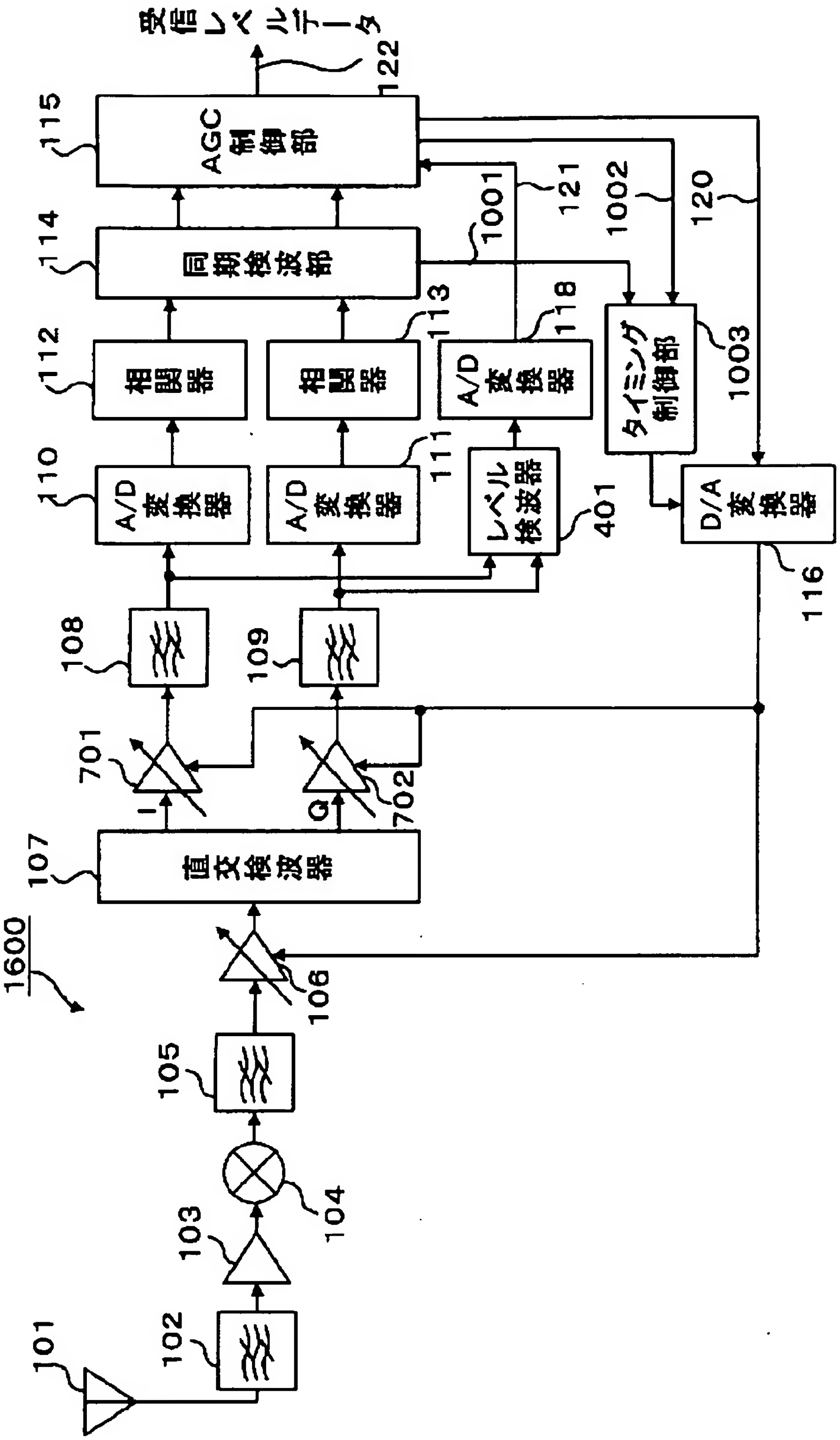
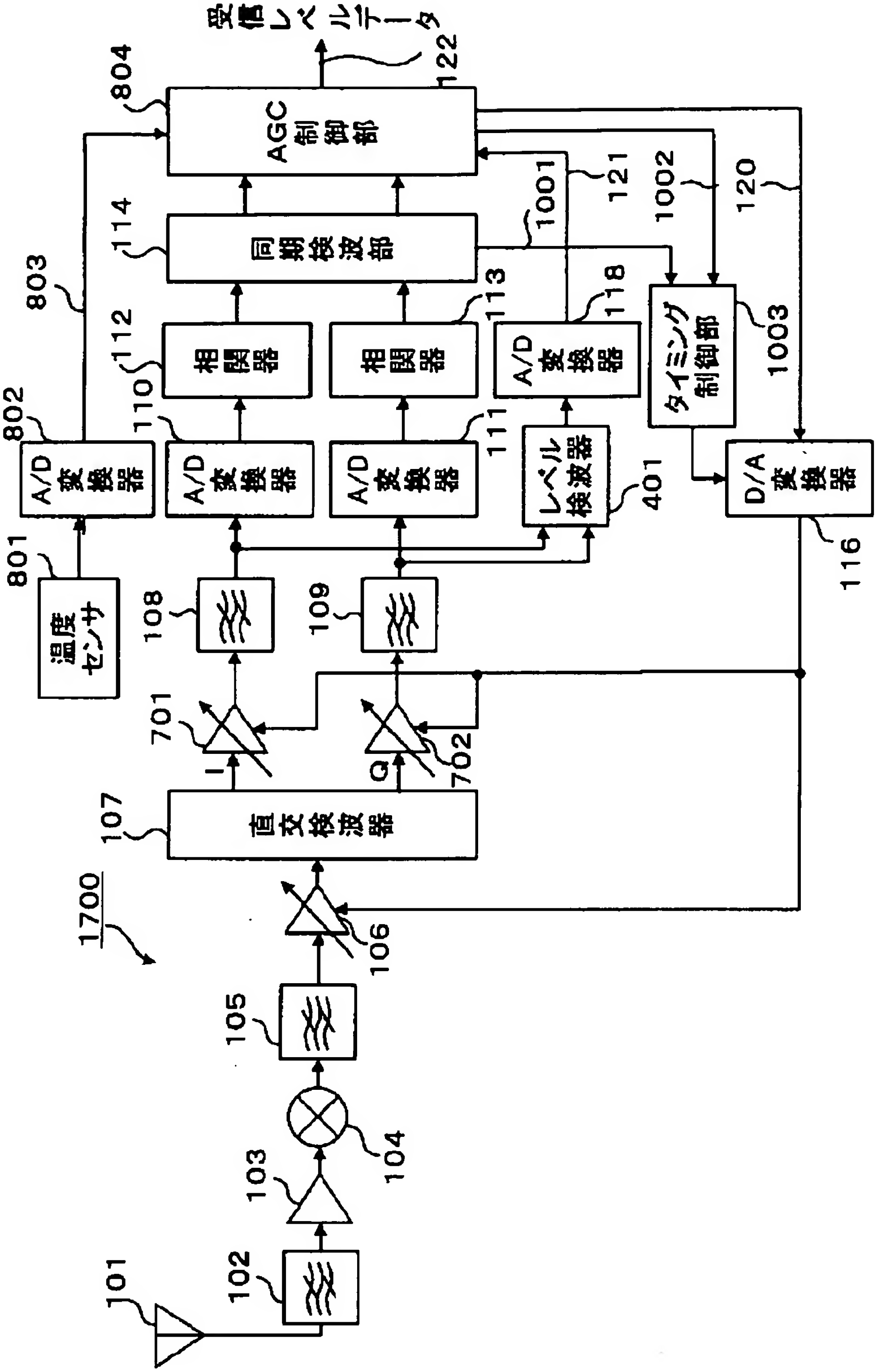
118
116
120
121
122
A/D変換器
相関器
同期検波部
AGC制御部
受信レベルデータ
501
温度センサ
502
503
601
602
603
604
605
606
607
401
レベル検波器
1001
1002
1003
タイミング制御部
1501
1502
D/A変換器

[Drawing 16]

h c g cg b eb cg e e


1600
直交検波器
I
Q
A/D変換器
A/D変換器
レベル検波器
相関器
相関器
A/D変換器
同期検波部
AGC制御部
受信レベルデータ
タイミング制御部
D/A変換器

[Drawing 17]


受信レベルデータ
122
804
AGC制御部
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同期検波部
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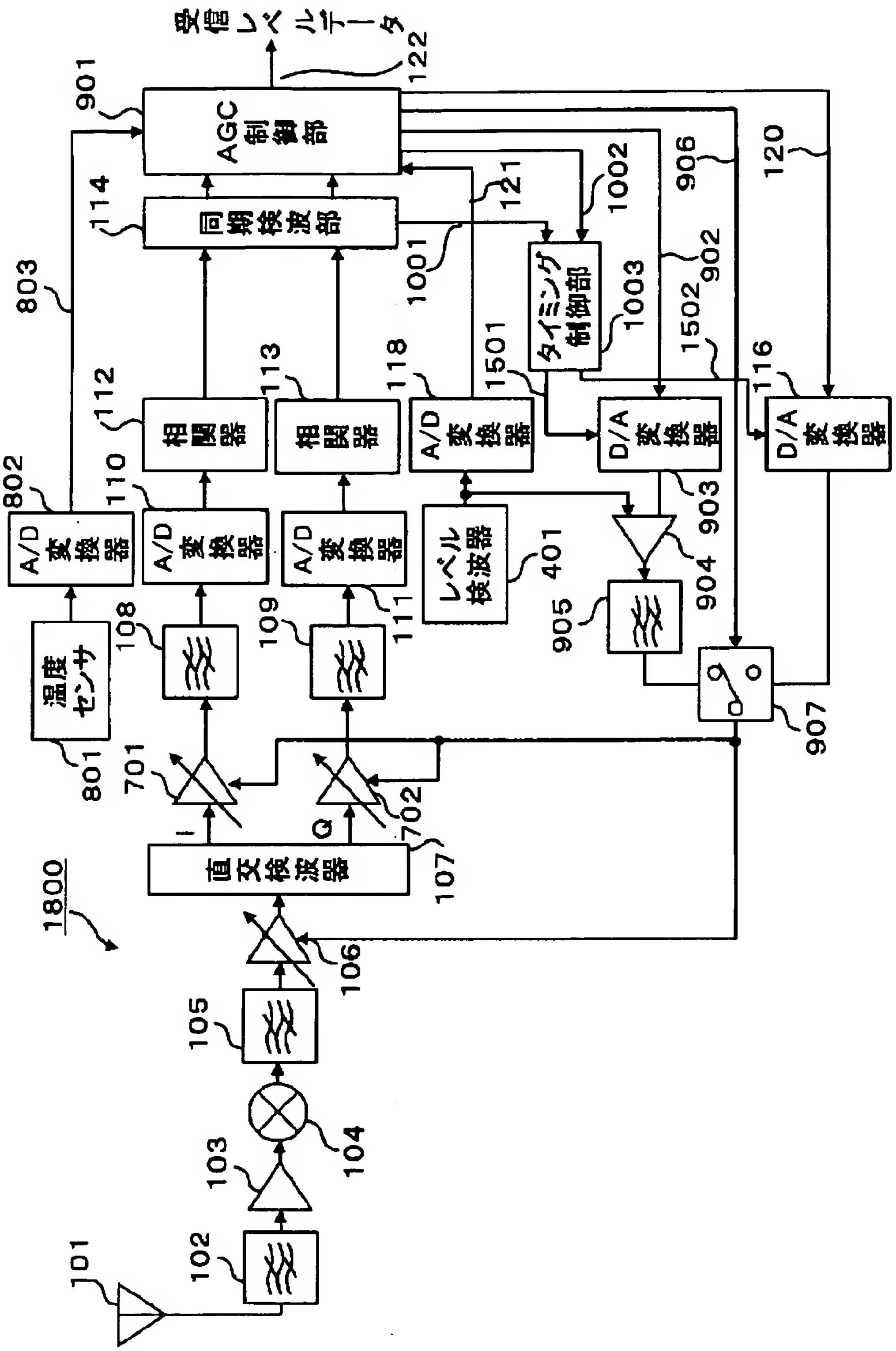
相関器
113
相関器
118
A/D変換器
タイミング制御部
1003
802
A/D変換器
110
A/D変換器
111
A/D変換器
レベル検波器
401
D/A変換器
116
801
温度センサ
108
109
701
702
I
Q
107
直交検波器
1700
106
105
104
103
102
101

[Drawing 18]

h c g cg b eb cg e e


受信レベルデータ
122
901
AGC制御部
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906
120
121
114
同期検波部
1001
タイミング制御部
1003
902
1502
803
1501
112
113
118
116
相関器
相関器
A/D変換器
D/A変換器
D/A変換器
802
110
A/D変換器
A/D変換器
A/D変換器
903
レベル検波器
401
904
温度センサ
108
109
111
905
907
801
701
702
I
Q
直交検波器
107
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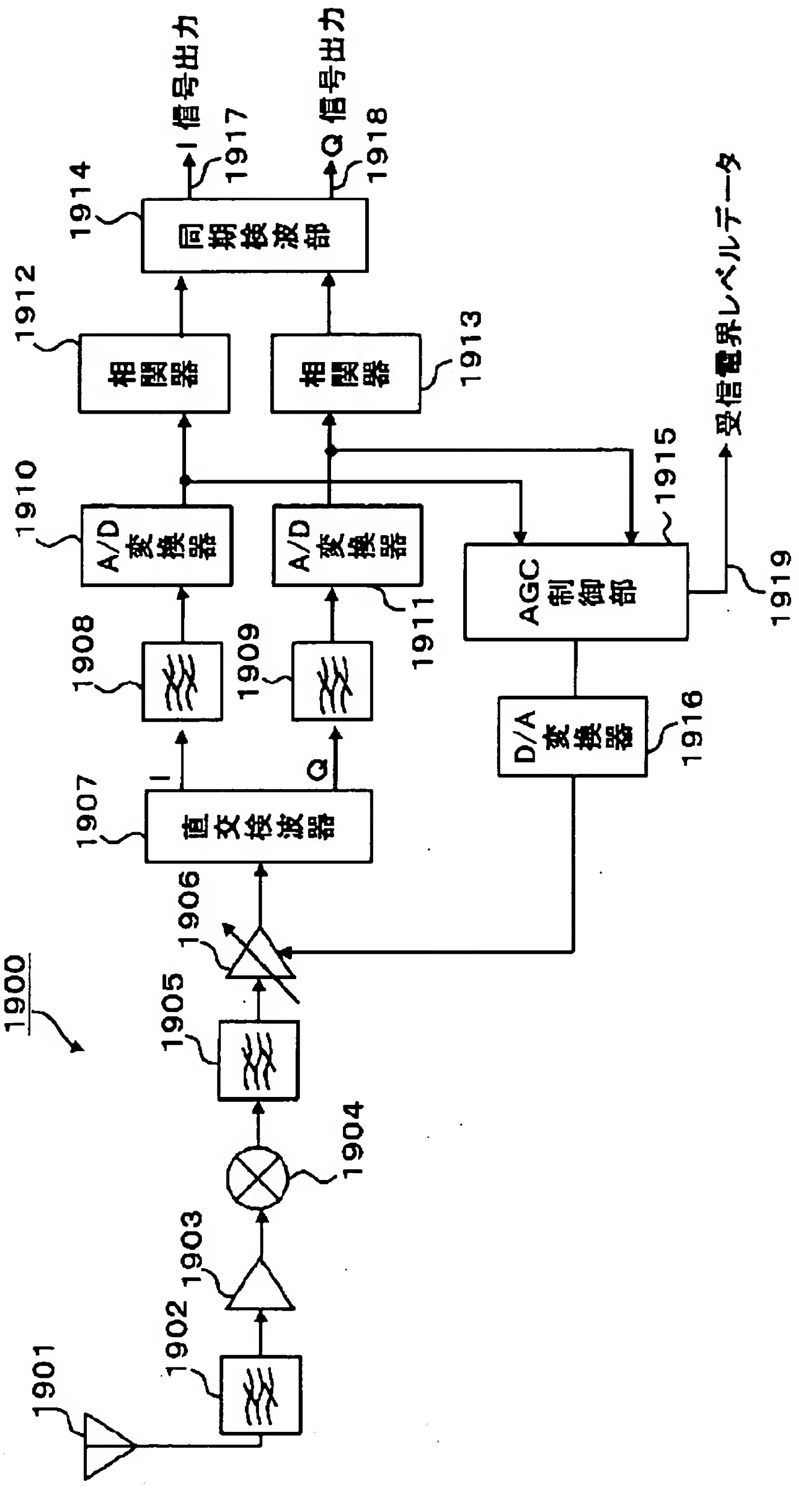
104
101
102

[Drawing 19]

h c g cg b eb cg e e


1900
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直交検波器
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A/D
変換器
1911
A/D
変換器
1912
相関器
1913
相関器
1914
同期検波部
1917
I 信号出力
1918
Q 信号出力
1915
AGC
制御部
1916
D/A
変換器
1919
受信電界レベルデータ

[Translation done.]